The RUBBER AGE

April, 1944

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DETROIT

Use

RIO RESIN

IN GR-S STOCKS

TO

1 Increase Elongation
2 Improve Flexing
3 Minimize Increase in Hardness
4 Maintain Tensile Strength
5 Quicken Cure

RIO is doing these in several places

R. T. VANDERBILT CO., Inc.

230 Park Avenue, New York City

R v.55 No-S 1944

Newsletter No. 4
APRIL, 1944

Published by Rubber Chemicals Division of DU PONT

SRA No. 2 for GR-S
A New, Versatile, Economical Accelerator

THE rubber industry has done a remarkably good job of adapting to GR-S compounding the many accelerators developed for use with crude rubber. Now they may have a new tool to work with—a new accelerator developed especially to bring out the best possible qualities of GR-S stocks.

SRA No. 2 is a self activated thiazole type accelerator. It is a light cream colored powder having a specific gravity of 1.33, and its melting point of approximately 210° F. assures easy dispersion under normal mixing conditions.

Unlike other thiazole accelerators, SRA No. 2 is less persistent and does not cause GR-S vulcanizates to stiffen so much on aging or fall off in tensile strength so much on long cures.

GR-S stocks cured with SRA No. 2 are characterized by—

1. Processing safety
2. Broad curing range
3. High tensile strength and elongation at break
4. Resistance to stiffening upon exposure to heat

Some of the interesting properties obtainable in GR-S with SRA No. 2 acceleration are shown graphically in Figures I and II. For comparative purposes, similar data are shown for the same stock containing other accelerators that have been used in the past. The compositions of the test compounds were as follows:

BASE COMPOUND

GR-S	100.0
Sulfur	1.7
EPC Black	45.0
Stearic Acid	1.0
Pine Tar	3.5
Coal Tar Softener	4.0
Zinc Oxide	3.0

ACCELERATION

	A	B
SRA No. 2	1.20	—
MBT	—	1.00
DPG	—	0.15

The relatively fast rate of cure and flat curing plateau imparted by the SRA No. 2 acceleration are well illustrated by the curves in Figure I. The almost complete lack of change in modulus, tensile strength and elongation between the 30 and 120 minute cures at 280° F. will be of inestimable value in numerous applications.

Figure II compares the physical properties and resistance to stiffening on heat aging. Not only did the SRA No. 2 acceleration impart superior original physical properties but also it resulted in a higher percentage of these properties being retained after aging 24 hours at 100° C.

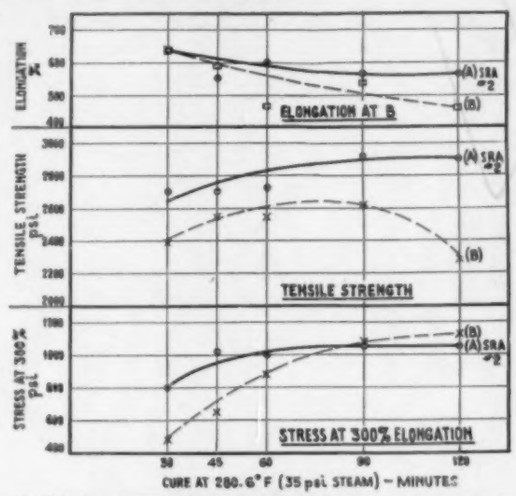


Fig. I. Effects of curing time at 280.6° F. on the stress-strain properties of GR-S tread stocks

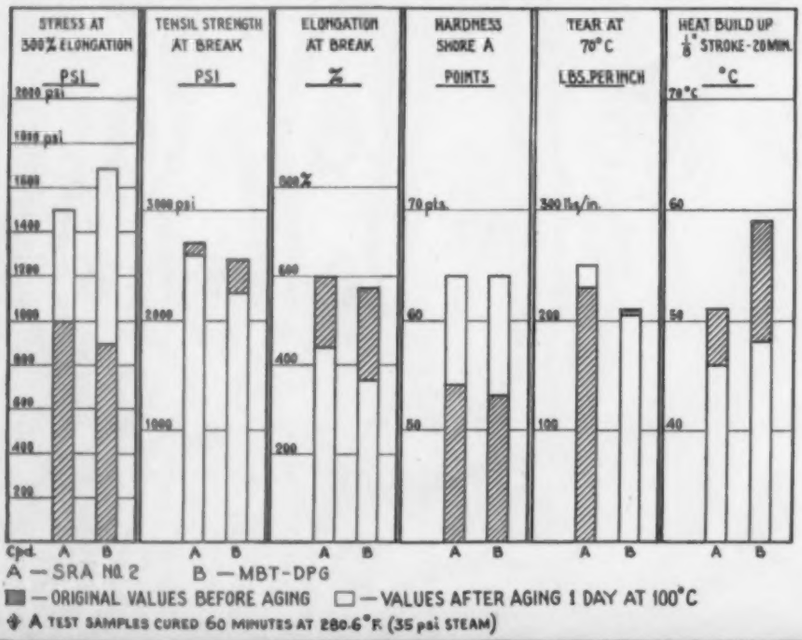
HEAT AGING resistance can be even further enhanced without impairing the rate or range of cure by adopting a higher ratio of SRA No. 2 to sulfur. A practical limit in tread type stocks of 2.4 parts of SRA No. 2 with 1.0 part of sulfur is the maximum generally preferred due to the tendency of higher ratios to reduce processing safety. In one series of tests using 1.2 parts of SRA No. 2 with 2.0 parts of sulfur as a control the accelerator-sulfur ratio was increased by doubling the SRA No. 2 content and cutting in half the sulfur content with the following effects on the vulcanizates after aging 4 days at 100° C.:

Modulus at 200% reduced from 1800 to 1100 psi.
Elongation at break increased from 270 to 370%.
Hardness reduced from 76 to 69.

THE VERSATILITY of SRA No. 2 permits its use, without additional activation, as an accelerator for hot air and open steam as well as press cures and in stocks loaded with non-black fillers and pigments as well as with the various grades of carbon blacks.

MORE DATA and additional suggestions for the use of SRA No. 2 are presented in a new report. If you have not yet received your copy ask for report BL-144, "Accelerator SRA No. 2—A Versatile and Economical Accelerator for GR-S (Buna S)."

Fig. II. Comparison of GR-S tread stocks A and B, before and after aging 24 hours at 100° C.



DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. April, 1944, Vol. 55, No. 1.

Tech.

TECHNOLOGY DEPT:

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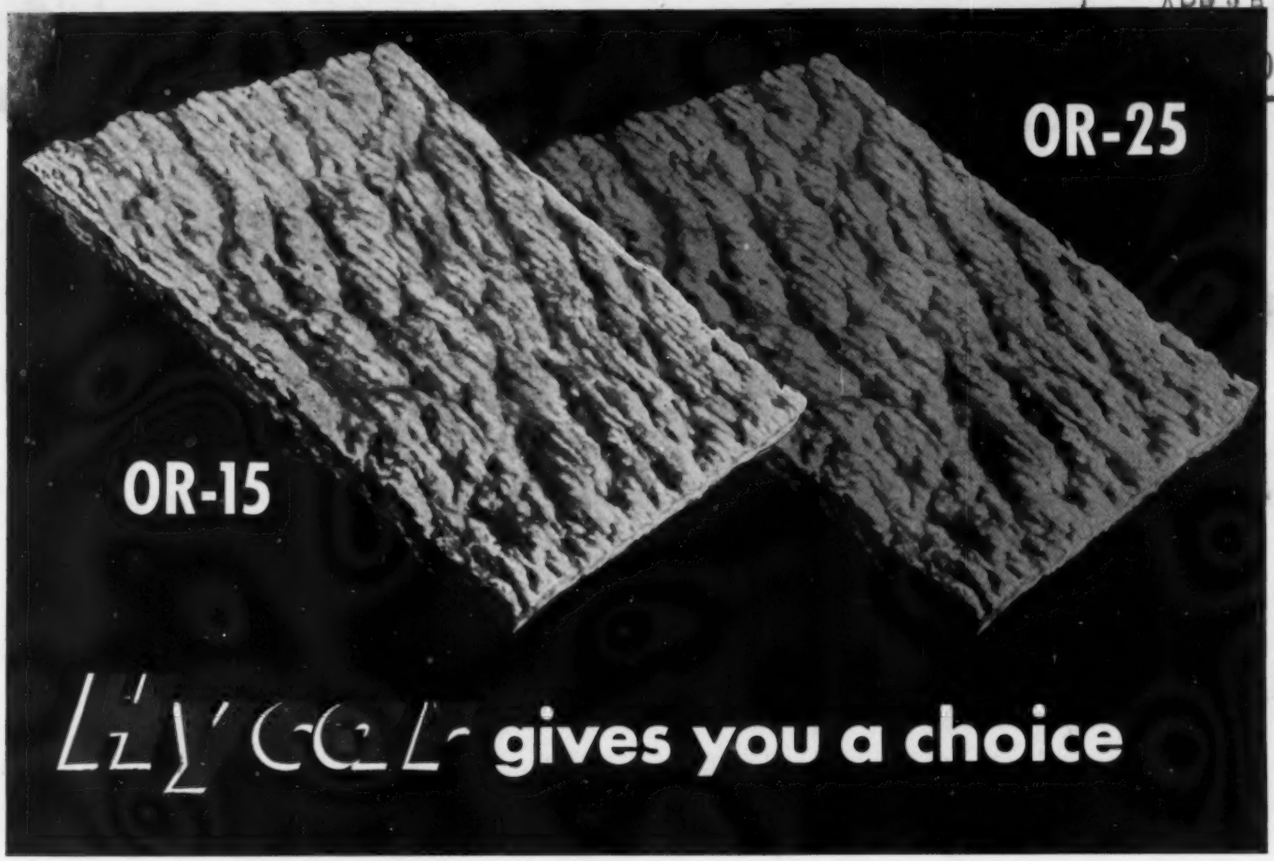


OR-15

High Tensile and Elongation

Compounds of Hycar OR-15 other than pure gum stocks are equal or superior to those of any other synthetic rubber and approach those of natural rubber, in tensile strength, elongation and modulus.

Oil and Solvent Resistance

Compounds of Hycar OR-15 are extremely resistant to and practically unaffected by oils, aliphatic hydrocarbons, glycols, esters, alcohols, fatty acids, carbon tetrachloride and salt solutions.

Aromatic Fuel Resistance

Hycar OR-15 compounds are unique in their ability to withstand the aromatic hydrocarbons found in many high octane gasolines. Although swollen to some extent by aromatics, the usefulness of Hycar OR-15 products is not impaired and no permanent deterioration occurs.

OR-25

Low Temperature Flexibility

Hycar OR-25 compounds have the extremely valuable quality of remaining flexible and serviceable at temperatures as low as —65° F. and at the same time have good resistance to oils and solvents and the effects of heat.

Positive Oil Swell

Since it is not quite as oil resistant as OR-15, Hycar OR-25 can be more readily compounded to produce stocks which will not decrease in volume after immersion in oil or gasoline. This is important in many sealing applications where it is essential to avoid shrinkage.

Low Compression Set

Hycar OR-25 can be compounded to obtain very low compression sets and high resilience, without undue sacrifice of other desirable properties.

In addition to their individual distinctive qualities, compounds of both Hycar OR-15 and OR-25 are characterized by exceptional resistance to the effects of heat; excellent abrasion resistance and age resistance and good flex life. Both materials may be blended with vinyl resins to produce stocks which can be exposed to direct sunlight without checking or deteriorating.

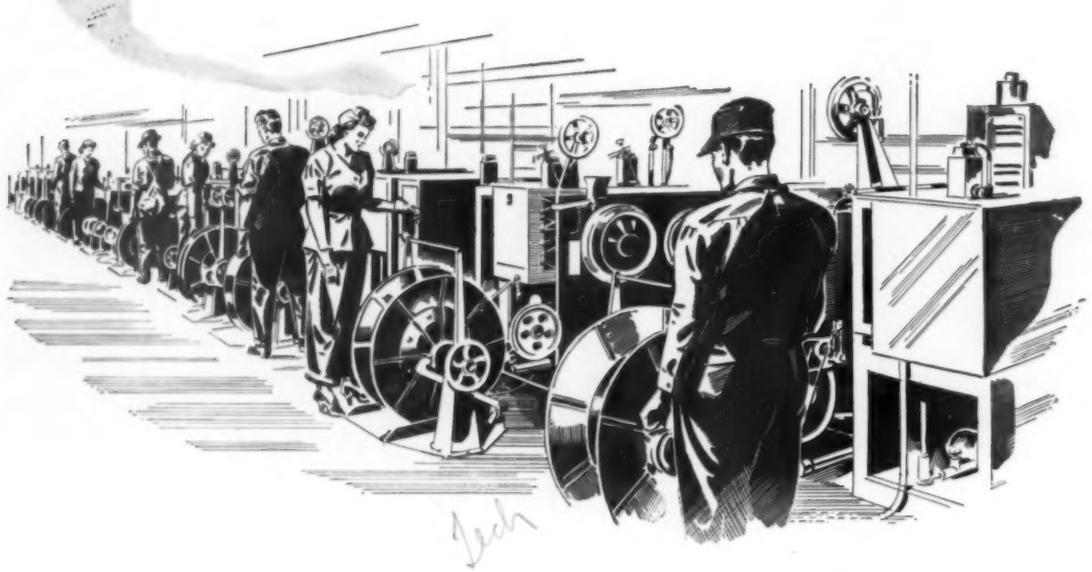
Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

There's RUBBER DUST in our wire-drawing room



NATIONAL-STANDARD devotes so much of its wire production to the rubber industry that the term "rubber dust" is familiar even to the men in our wire-drawing rooms. We've worked with tire engineers in producing better bead wire, braids and tapes; with mechanical goods men on new uses for wire in flat and V-belts and braiding for hose; with aviation experts on improving the performance of non-skid tires and de-icers, with wire.

We don't think for a minute that all the uses for wire with rubber have been explored. We're constantly working on new ideas and we know that you are too. If you've got a problem to solve, perhaps our experience and research facilities can help. We try to make National-Standard the kind of place where you'll get the quickest answers, most helpful service, and the very best wire it is possible to produce.

★ ★ NATIONAL STANDARD Company ★ ★

Divisions of National-Standard Company

NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

WAGNER LITHO MACHINERY
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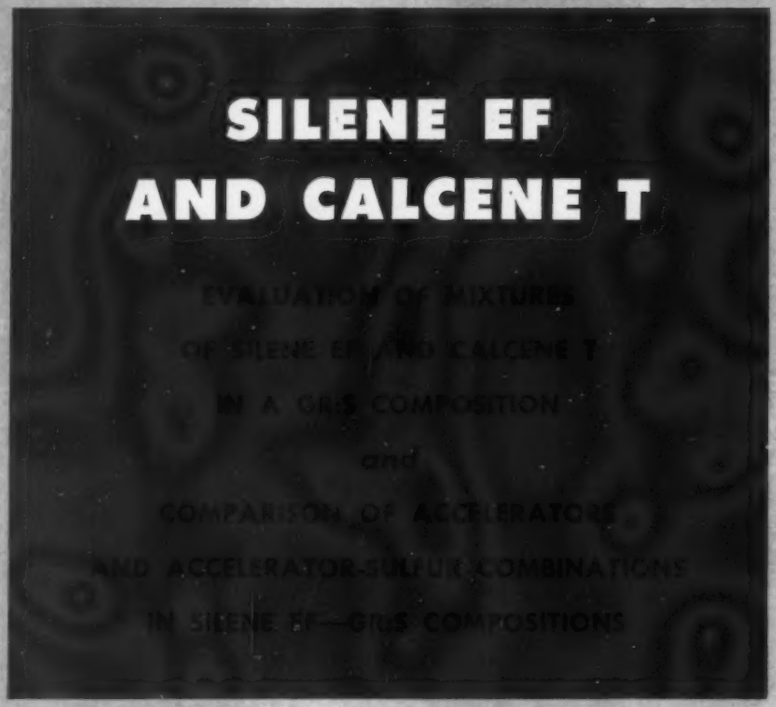
ATHENIA STEEL
Clifton, N. J.
COLD ROLLED, HIGH-CARBON SPRING STEEL

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

Compounders: Send for Free New Data



Two new reports from Columbia laboratories of interest and importance to rubber compounders working with GR-S.

The first shows how the physical properties of non-black stocks can be varied through a considerable range of modulus by varying ratios of Silene EF and Calcene T.

The second shows results obtained with 40 volumes of Silene EF with several different accelerations and the effect of varying sulfur level with one accelerator.

Write for Columbia Pigment Data Sheets No. 43-5. There is no charge.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING, PITTSBURGH 19, PENNSYLVANIA

Chicago • • • Boston • • • St. Louis • • • Pittsburgh • • • New York • • • Cincinnati
Cleveland • • • Minneapolis • • • Philadelphia • • • Charlotte

DO YOU HAVE NEW PRODUCTS which you believe will interest us? One of the important members of our Purchasing Staff is a chemical engineer who directs the testing of new materials and who sees that new ideas are thoroughly investigated. If you have new products or services of the type we might use, bring them to the attention of our Purchasing Engineer, Barberton, Ohio. Full consideration is assured.

THE SAME GREAT STRATA of salt under its Barberton, Ohio, plant furnishes brine for the DPC plant operated by Columbia at Natrium, W. Va. At Barberton, however, the salt bed is only 2,800 feet below the surface, compared to the 6,720 foot depth which makes the Natrium deposit the deepest in the world in commercial use. The bed is 120 feet thick at this point.

A STRIKING EXAMPLE of the growth of the chemical industry is found in the production records of Caustic Soda. In 1899—the year of Columbia's organization—total U.S. production of this chemical was 167,000 tons. By 1941—before the impetus of our nation's war needs—the chemical industry itself was consuming 220,000 tons of the total national production of 1,095,000 tons, and Columbia's Caustic Soda output alone exceeded the total 1899 production by a substantial margin!

A TOTAL OF 908 Columbia employees are now with the armed forces. And 100% of those who are keeping Columbia going at top speed are backing up their buddies with War Bond subscriptions. We hope your own organization is also Backing the Attack to the very limit.

COLUMBIA CHEMICALS include Soda Ash, Caustic Soda, Sodium Bicarbonate, Liquid Chlorine, Silene EF (Hydrated Calcium Silicate), Calcium Chloride, Soda Briquettes, Modified Sodas, Caustic Ash, Phosflake, Calcene (Precipitated Calcium Carbonate), and Calcium Hypochlorite.

THE SIGN OF THE MOST COMPLETE LINE OF ZINC OXIDES

• The Sign of the most complete range of zinc oxide particle size characteristics — ranging from the colloidal dimensions of Kadox to the relatively coarse Horse Head XX Red-78.

• The Sign of the manufacturer of both "fast" curing and "slow" curing zinc oxides.

• The Sign of zinc oxides made under three different processes—American Process, French Process, Palmerton Process — in order to impart special properties to meet a variety of special rubber requirements.

• The Sign of the manufacturer of special zinc oxides for improved processing.

• The Sign of the largest and best equipped research organization devoted to the study of zinc products.

THE NEW JERSEY ZINC COMPANY

Manufacturers of the Famous Horse Head Zinc Products

NAFTOLEN

REG. U. S. PAT. OFFICE

QUALITY *plus* QUANTITY

Your Problem Today . . .

The uninterrupted production of high quality rubber goods from GR-S.

The Solution . . .

The use of Naftolen—a proven product of high quality—available in any desired quantity.

Naftolen will insure uniformity in the factory processing of your compounds—in the quality of your finished products.

Play safe—use Naftolen—a superior product.

W C=C

REG. U. S. PAT. OFFICE

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street, New York 16, N. Y.

SPECIALISTS
in LINER *Processing*

Since 1922 we have specialized in processing liner fabric, and most of our employees have had 17 or more years' experience in our plant.

Today, Climco Processing is universally recognized as the best treatment to insure better separation and eliminate stock adhesions. It saves: (1) repairs due to sticking and tearing, (2) cleaning between trips to the calender, (3) rerolling for cooling. This leads to lower labor and power costs and greater life for the fabric.

Give Climco Processing a trial in your plant *now*.

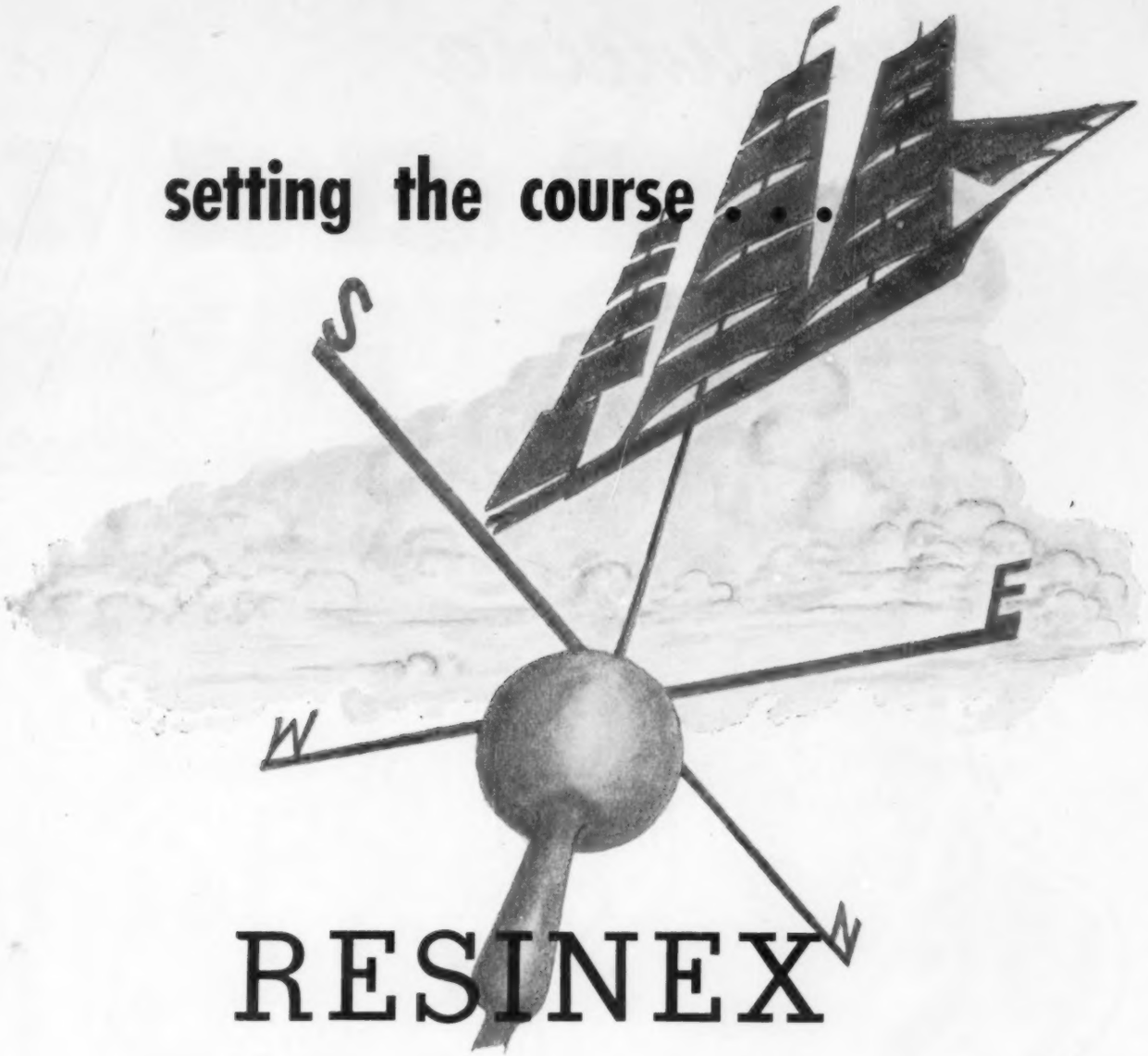
THE CLEVELAND LINER & MFG. CO.
CLEVELAND, OHIO

CLIMCO

CLIMCO PROCESSED LINERS
for Faster, Better Production at Lower Cost

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

setting the course . . .



RESINEX

Many Research Engineers have set their course toward greater product improvement with this remarkable resinous development.

RESINEX is providing so many **better** qualities to certain of our rubber product needs that its list of applications is growing constantly — and rapidly.

RESINEX is low in cost and plentiful. It is compatible with all rubbers. Its present uses are broad — tires, tubes, camelback, tank track, soles, heels, hose and a variety of other products.

RESINEX will give your products these needed qualities — greater resistance to tear and abrasion, higher tensile and elongation, better aging.

Write for all the facts about RESINEX and samples for laboratory or test runs.

Precision Chemicals for Rubber and Plastics

STANDARD *Chemical Company*

General Offices: AKRON 8, OHIO

Announcing

PHIL

A New and

Product of

PHILLIPS

PETROLEUM COMPANY

Bartlesville, Oklahoma

PHILBLACK DIVISION • FIRST CENTRAL TOWER • AKRON, OHIO

B L A C K

Superior BLACK Now Available - - -

PHILBLACK A

This amazing new HMF type black imparts the following advantages:

EXCELLENT PROCESSING

LOW HYSTERESIS

IMPROVED RESISTANCE TO CUT AND CRACK GROWTH

The properties and advantages of this new and different type black are completely presented in a new booklet "PHILBLACK A". Write or wire for this booklet, prices, availability, and samples.

PHILLIPS PETROLEUM COMPANY

Philblack Division

FIRST CENTRAL TOWER • AKRON, OHIO

LOOK TO US FOR HELP . . . For some time now, your technicians have been working with synthetic rubber. They have learned a lot about its fabrication, and they are becoming more familiar with it day by day.

However, because synthetic rubber is man-made, and not the natural product they have been used to, it may present new and different problems. And the solution of these problems, by trial and error, or by systematic research, may take valuable time.

A better answer is to call on our scientists for help. These men developed Perbunan in the Esso Laboratories of the Standard Oil Development Company. They know it from crude oil to finished rubber. They, and our staff of field technicians, can help solve your problem.

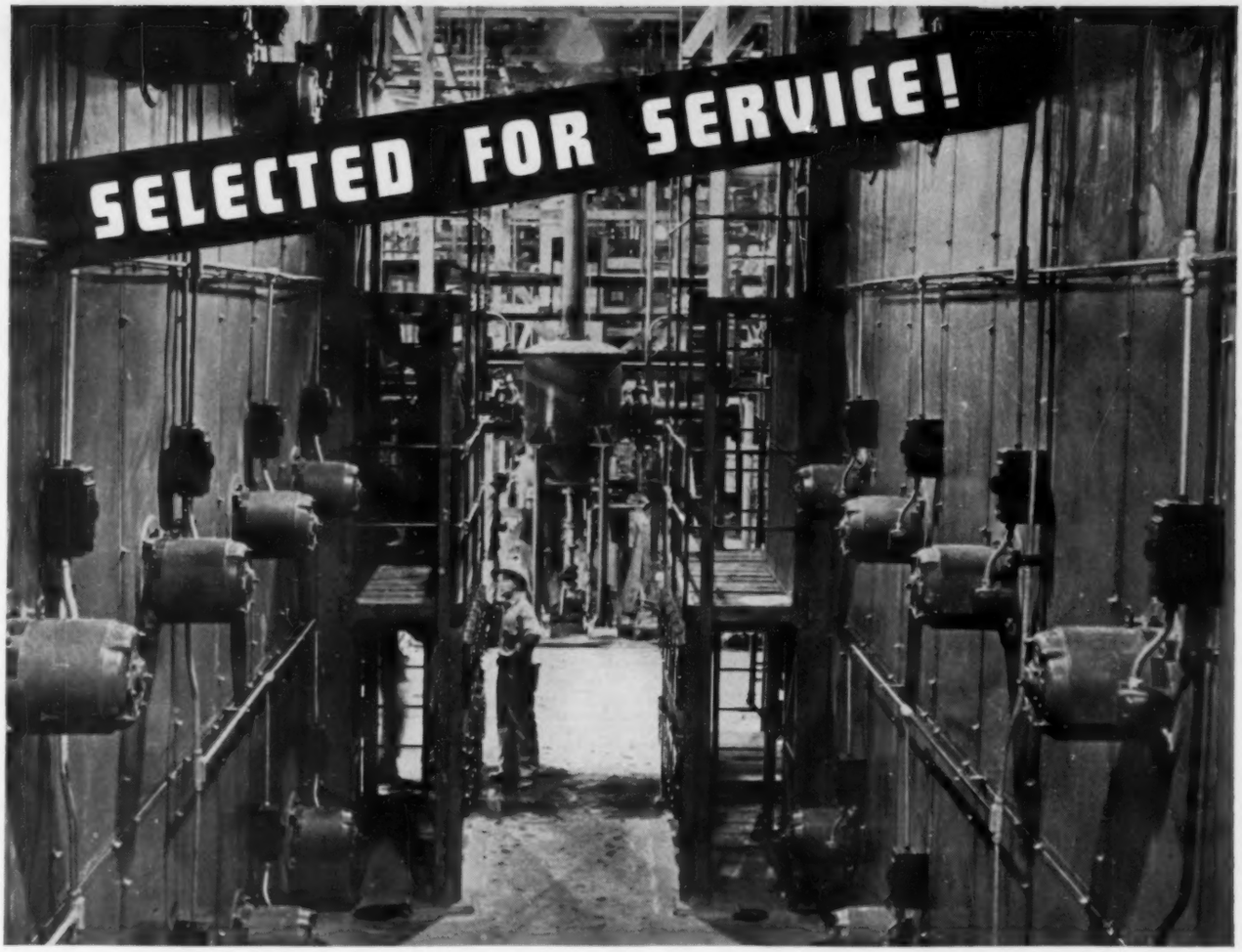
Look to these men for help. All their experience is yours for the asking.

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME.

Write STANCO DISTRIBUTORS, INC., 26 Broadway, New York 4, N. Y.

Warehouse stocks in New Jersey, Louisiana and California



62 PROCTOR DRYERS IN OPERATION AT U. S. SYNTHETIC RUBBER PLANTS...

The majority of machines for drying Buna-S rubber in the U. S. Government Standardized Rubber Program are Proctor Dryers. These giant dryers are designed to perform equally well in the drying of Buna-N and Butyl rubber.

Sixty-two of these dryers are in operation in the United States in plants operated by the major rubber companies for account of Rubber Reserve Company.

Prior to the beginning of this vast U. S. Government endeavor Proctor & Schwartz had developed and put into successful operation dryers for the efficient handling of much of the early synthetic rubber. Recognized for leadership in the field of industrial drying Proctor & Schwartz were the logical choice to build this equipment so vital to the nation's synthetic rubber program.

PROCTOR RUBBER DRYERS

manufactured by
PROCTOR & SCHWARTZ • Inc.
PHILADELPHIA, PA.

if your Banbury could *think!*

There would be some "dark" thoughts directed at you if your Banbury had the power to nurse grudges. . . The overload of production, the strain of synthetic mixing could make it cry out in anguish . . . But Banburys can only suffer in silence — until a broken rotor sounds its rattle of surrender. Unless your Banbury is redesigned to *take it*, strenuous mixing schedules of synthetic compounds may cause harmful delays. Excessive wear, cracked and broken rotors can take their toll of production — and skyrocket costs. We have the experience and the "know how" to adapt your Banbury for these new requirements . . . We are redesigning and rebuilding Banburys for the leaders in the Industry. Write, wire or phone us about your Banbury today.

We need spare Banbury parts. . . If you have any extra parts you will be helping someone else by letting us buy them. They are urgently needed.

SERVING THE IWS RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

NOW AVAILABLE!

Continex SRF

SEMI-REINFORCING FURNACE BLACK

FACTORY BATCH SAMPLES CAN NOW BE OBTAINED

After many months of development, single unit production of Continex SRF is now under way to be followed by full scale operation upon completion of the new Continental Furnace Black plant in June.

Representative of actual plant production, samples of Continex SRF now can be obtained for testing purposes which will serve as a reliable basis for determining your Continex SRF requirements. Sample orders will be filled promptly.

CONTINENTAL CARBON COMPANY
MANUFACTURER
[CONTINENTAL CHANNEL AND FURNACE BLACKS]

WITCO

WITCO CHEMICAL COMPANY
DISTRIBUTOR
[FORMERLY WISHNICK-TUMPEER, INC.]

MANUFACTURERS AND EXPORTERS

295 MADISON AVENUE, NEW YORK 17, N. Y. · Boston · Chicago · Cleveland · Akron · Detroit · London

How WITCO MR INCREASES FLEX CRACK RESISTANCE IN GR-S

WITCO M. R. IN TYPICAL TIRE TREAD STOCK FORMULA

Parts by Weight	#1	#2	#3	#4	#5
GR-S	100.	100.	100.	100.	100.
Zinc Oxide	5.	5.	5.	5.	5.
Stearite	2.	2.	2.	2.	2.
Mercaptobenzothiazole	1.5	1.5	1.5	1.5	1.5
Sulfur	2.	2.	2.	2.	2.
Witco #12 Channel Black	50.	50.	50.	50.	50.
Witco #38 M. R.	0.	10.	20.	30.	40.
Width of Crack after 19,000 Flexing Cycles (in centimeters)	2.3	1.1	0.67	0.42	0.34

In order to more clearly illustrate the relative extent of the cracks in the various samples, each was dusted with a white pigment.

The photograph tells the story. Reading from left to right, each sample tested graphically illustrates the effect of added amounts of Witco M. R. (Hydrocarbon) on the flex crack resistance of a typical GR-S tire tread stock formula.

In the tests conducted at Witco's research laboratory all the samples were flexed simultaneously. After 19,000 flexing cycles the width of the resulting cracks decreased from 2.3 centimeters to .34 centimeters, as additional amounts of Witco M. R. were used. (See Table.)

But the tests revealed additional advantages, too, of Witco M. R. It makes the uncured stock more plastic and therefore easier to process; increases tensile strength and tear resistance; decreases the effect of aging on lowering tensile strength; lowers elongation and hardens the uncured stock; decreases modulus and resilience.

You will find Witco M. R. well worth investigating in your own processing. Write for samples or talk it over with one of our technical representatives.

WITCO CHEMICAL COMPANY MANUFACTURERS AND EXPORTERS

[FORMERLY WISHNICK-TUMPEER, INC.]

295 MADISON AVENUE, NEW YORK 17, N. Y. • BOSTON • CHICAGO • DETROIT • AKRON • CLEVELAND • LONDON

If You Are

Compounding Synthetic Rubber Latices

—BUNA S
—NEOPRENE
—HYCAR

Investigate

RESIN EMULSIONS and DISPERSIONS

for

TACKIFYING
REINFORCING
EXTENDING

★

AMERICAN RESINOUS CHEMICALS CORPORATION

Rubber Substitutes • *Rubber Synthetics* • *Resin, Lacquer Emulsions*

MAIN OFFICE and LABORATORIES

PEABODY, MASS.

Factory Branches: Newark, N. J. and Chicago, Ill.

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A typical example of

B. F. GOODRICH DEVELOPMENT IN RUBBER

"The jagged holes were made by machine gun bullets that went right on through, but the tire didn't go flat. . . . Even with the air gone the tire itself will support the load and run forty miles before going flat."

Photograph courtesy of B. F. Goodrich.

6

Baker Chemicals

FOR THE RUBBER INDUSTRY

MAGNESIUM OXIDE
MAGNESIUM CARBONATE
CALCIUM NITRATE
LEAD ACETATE
LEAD PEROXIDE
CARBON DISULFIDE

When Rubber is

MORE THAN RUBBER

New Qualities Long Hoped for Developed in Various Synthetics

Out of our war-time shortages of natural rubber have come many synthetics that render a greater service. And here's the major reason. These synthetics were custom-built to *specific* rather than general needs.

The J. T. Baker Chemical Co., in step with the changing chemical needs of those who work with rubber, has been going along with this expanding technology. When chemicals were required to give synthetics certain qualities, Baker frequently made these chemicals to the rubber industry's defined specifications.

Today, Baker not only supplies large quantities of Calcined Magnesia to meet the exacting requirements of Neoprene compounders, but also Magnesium Carbonate for its reinforcing qualities and high tensile strength.

Baker makes four other sales leaders for the rubber industry to predefined specifications: Calcium Nitrate, Lead Acetate, Lead Peroxide and Carbon Disulfide.

If you have need for one or more of these chemicals—or require a special chemical custom-built to your own rigid specifications, we urge you to write. Our chemical, technical and executive staffs are at your service. Your inquiry will be treated in strict confidence.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, New Jersey. *Branch Offices:* New York, Philadelphia and Chicago.

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Baker

More Precious Than Diamonds . .

Photo courtesy Baumgold Bros., Inc., N. Y.

. . Is Scrap Rubber Today

And our experience of over 75 years in the collecting, sorting, and distribution of scrap rubber exclusively assures speed, accuracy, and a minimum of waste in that material so important in the war program. We help to keep 'em rolling on to victory.

★

THE LOEWENTHAL COMPANY

JACK SIDER, President **J. K. McELLIGOTT, Exec. Vice-Pres.**

"Jack and Mac Are Here to Serve You"

CHICAGO 1 — 188 West Randolph St.
AKRON 5 — 159 Clewell Street

CABLE ADDRESS: "GYBLOWELL" . . . . Chicago, Ill. and Akron, Ohio

A new *Thiokol** SYNTHETIC RUBBER

TYPE ST

TO the familiar solvent resistance characteristic of all types of Thiokol synthetic rubber, Type ST adds a *new* and outstanding advantage —greatly increased resistance to cold flow.

A second important characteristic of Thiokol ST is its excellent flexibility at low temperatures —a property obtained without the addition of liquid plasticizers. This feature is of particular interest in aircraft applications, where liquid plasticizers may be extracted by aviation fuels and hydraulic brake fluids.

Easier processing and improved odor characteristics are other advantages of the new material.

Write for full information on Thiokol ST.

THIOKOL CORPORATION, Trenton, N. J.

Manufacturers of THIOKOL SYNTHETIC RUBBER and RUBBER CHEMICALS*

* Thiokol Corporation Trademark Reg. U. S. Pat. Off.

NEVILLE

NEVOLL*

GR-S Synthetic Rubber Softener

*REG. U.S. PAT. OFF.

- NEVOLL*, a coal-tar softener, is finding considerable use as a softener and plasticizer for the new GR-S (Buna S) synthetic rubber.
- It meets the Rubber Reserve Company's Contract Specification for coal-tar softener dated Nov. 21, 1942.
- NEVOLL* is currently quite readily available for prompt shipment in tank cars and drums.

Ask for a sample and further information from us or our agents

THE NEVILLE COMPANY

PITTSBURGH · PA.

Chemicals for the Nation's War Program

NEVILLE SALES AGENTS TO THE RUBBER INDUSTRY

U. S. A. (other than Mass. and R. I.), Canada, Mexico

CHARLES T. WILSON, CO., INC.
United Bldg., Akron, O. — 120 Wall St., New York

Mass. and Rhode Island

T. C. ASHLEY & CO.
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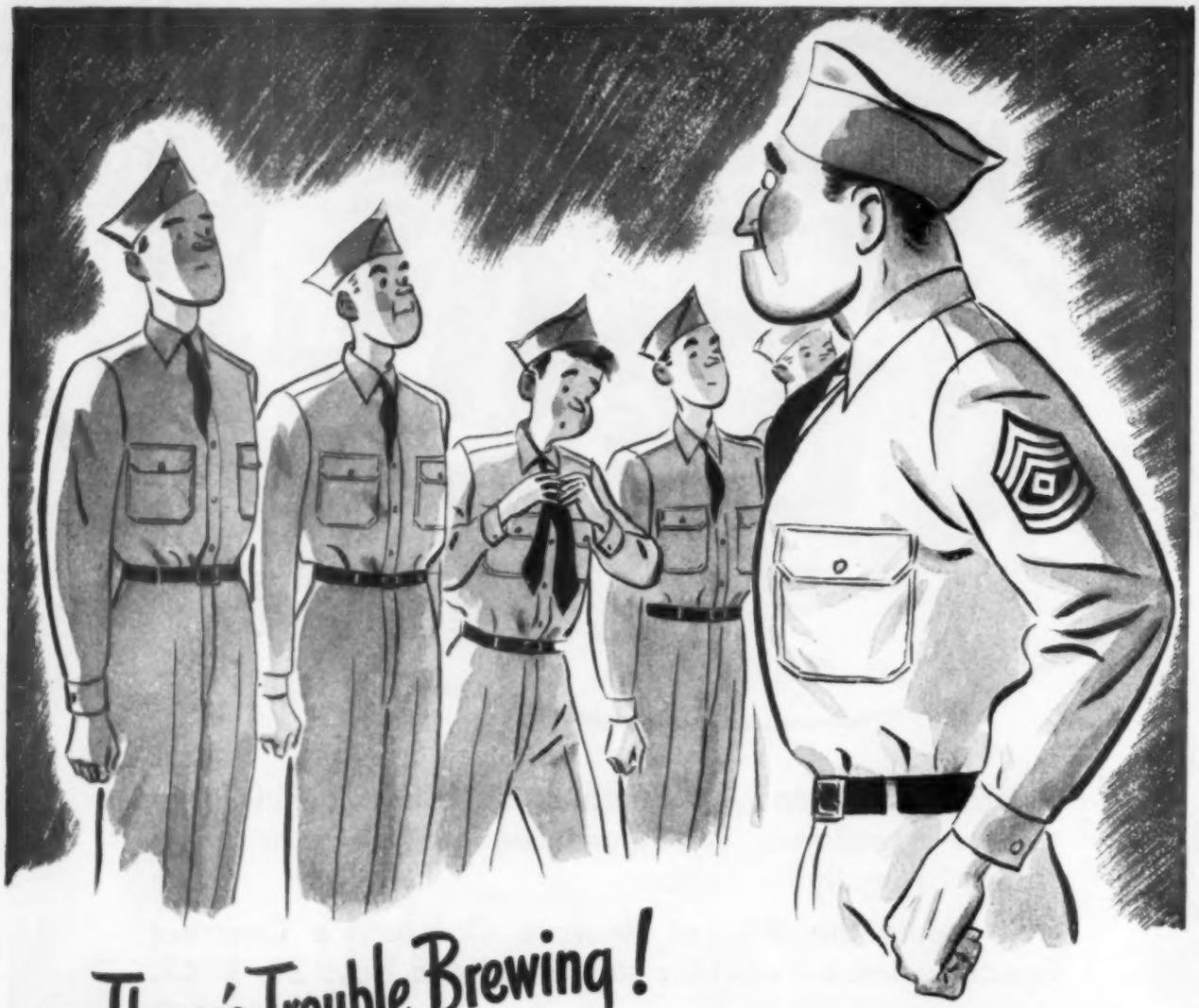
R-8



...There's Trouble Brewing!

Yes—and there's trouble brewing in YOUR plant when shipments of the solvent you are using for a certain job vary in uniformity. You've got to have UNIFORMITY in solvents to keep production at its peak and protect the quality of *your* product.

Specify SKELLYSOLVE and you'll *get* uniformity. That means a given type of SKELLYSOLVE ordered today will be absolutely *duplicated* in the same type of solvent ordered next week or months hence. You can depend on SKELLYSOLVE—because we depend on *scientific, instrumented quality control* in the manufacturing process.

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, tuluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.

BUNATAK-U

REG. U. S. PAT. OFFICE

The *QUALITY* PLASTICIZER for Synthetic Rubbers

●

IN successful use today by leading rubber manufacturers using **GR-S** in the production of such items as:

FOOTWEAR—Outsoles, Uppers, etc.
PROOFED GOODS—Calendered, Spread.
THREAD—Rubber Covered.
MOLDED GOODS—Of Many Types.

●

BUNATAK-U is particularly effective in

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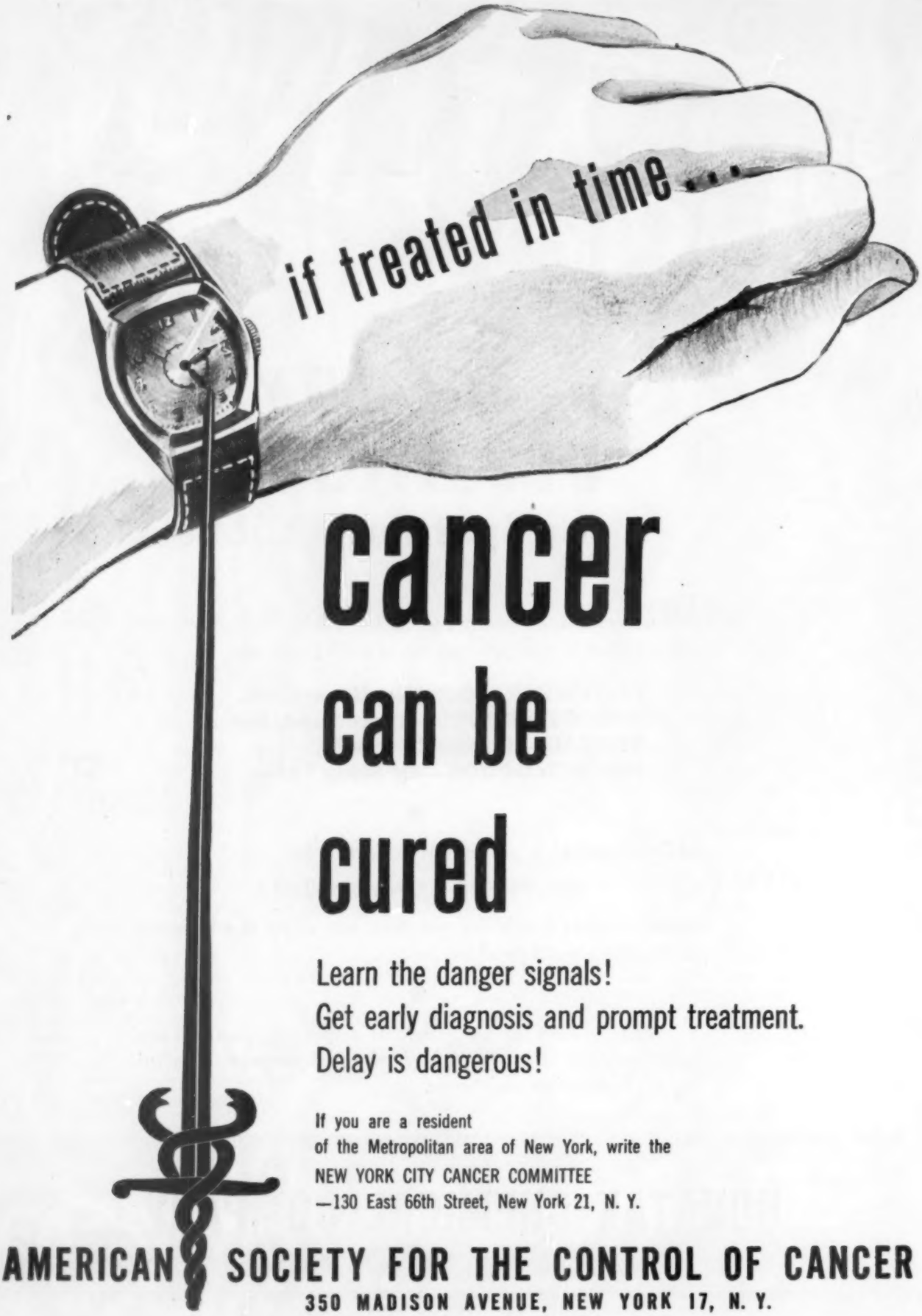

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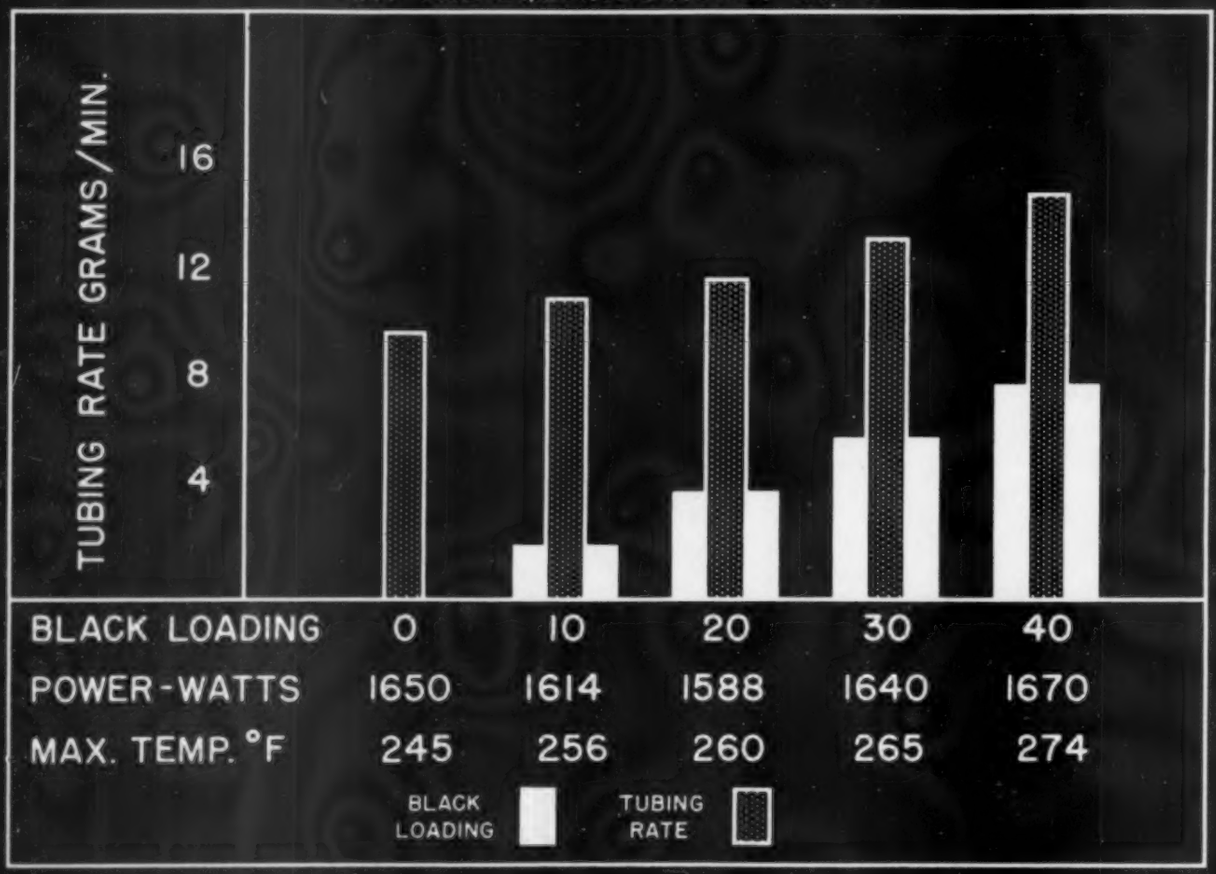

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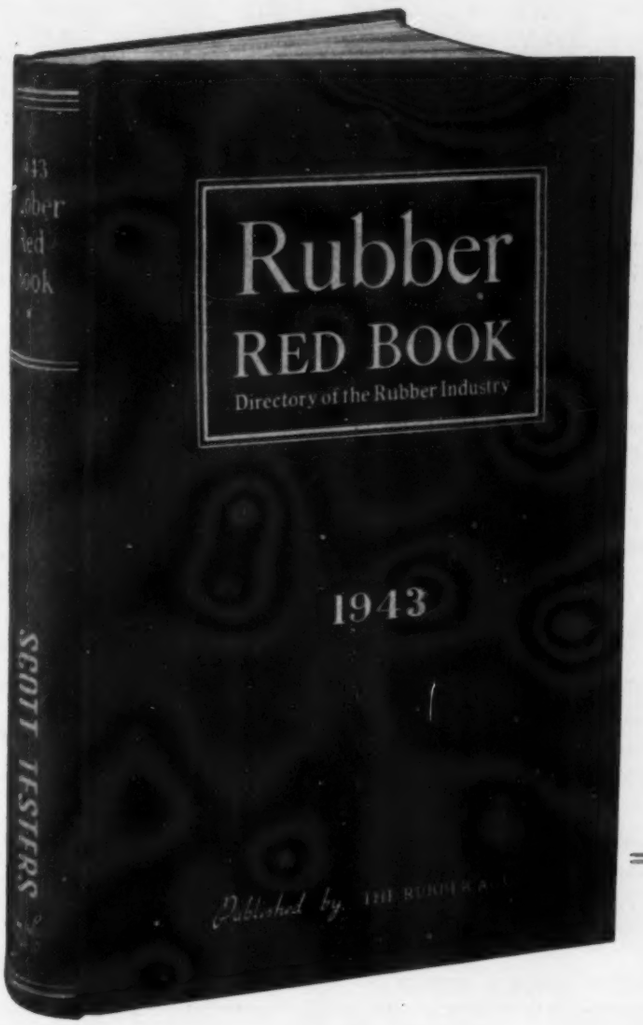

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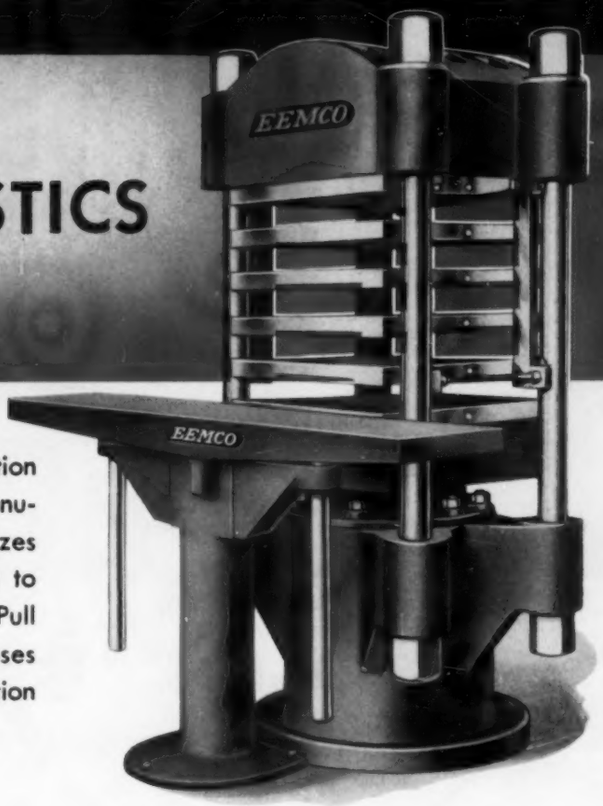

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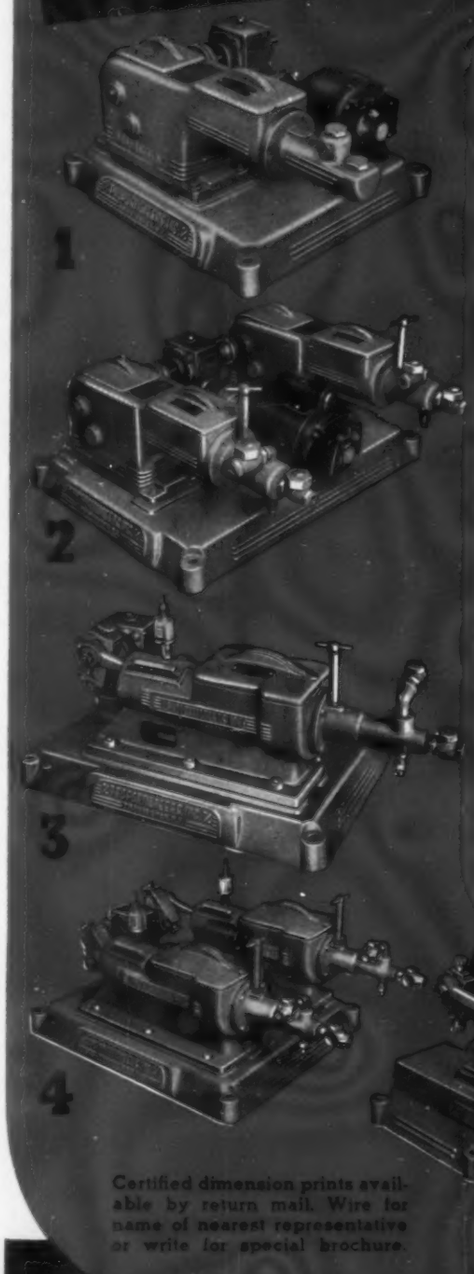

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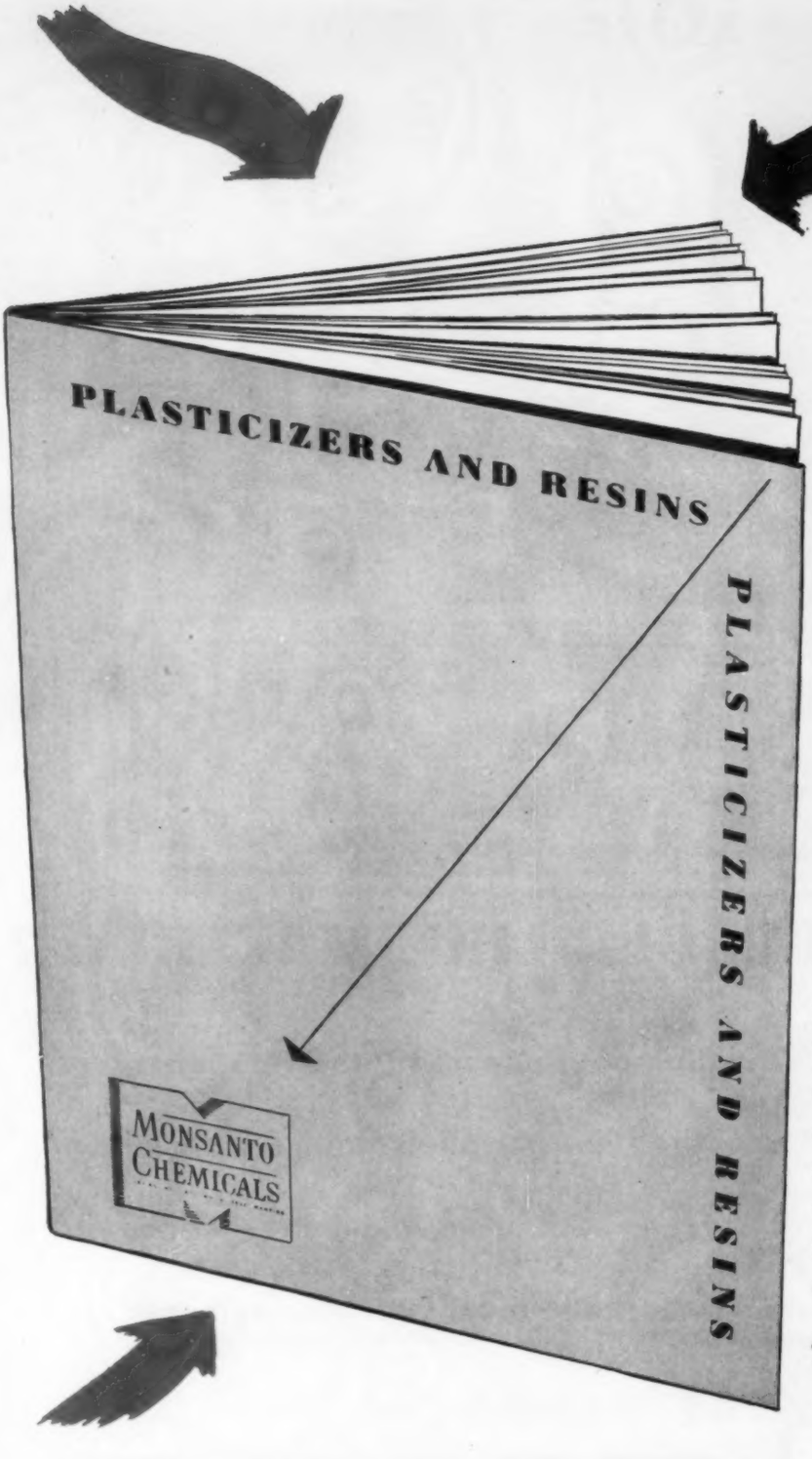

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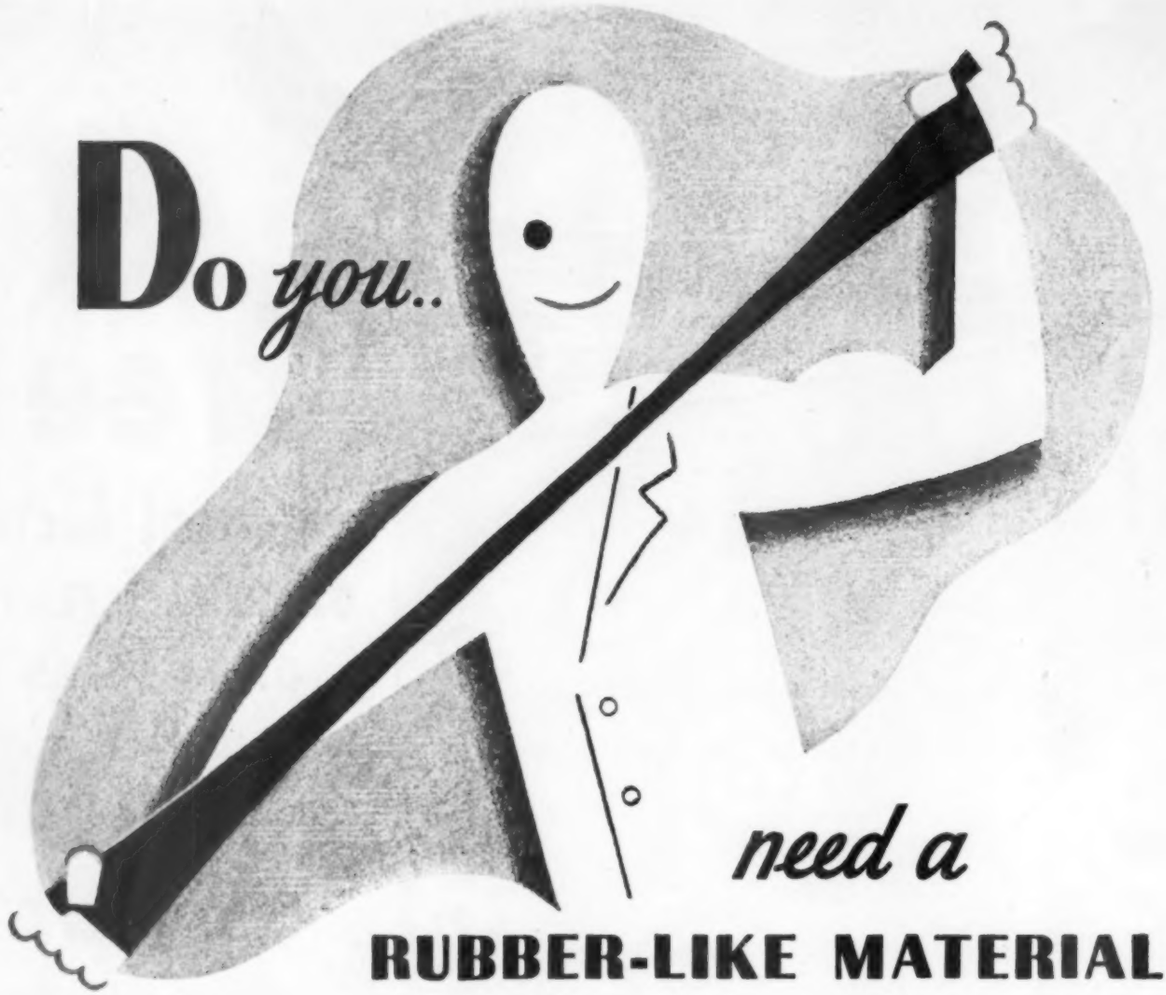

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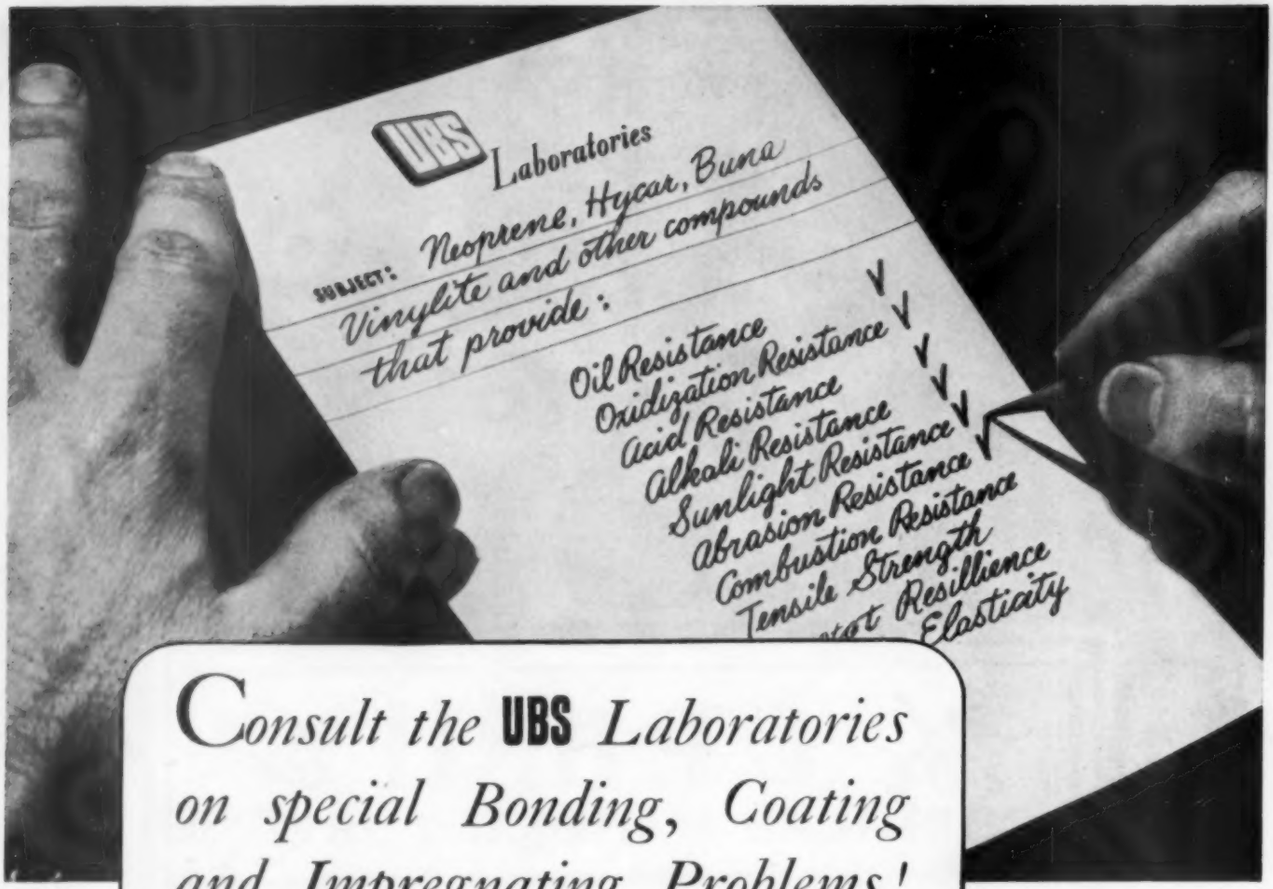

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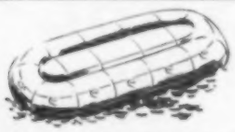

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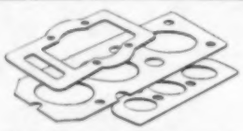

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State	Liquid

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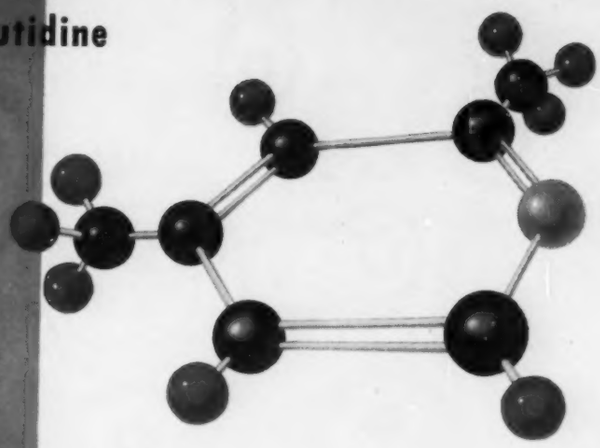

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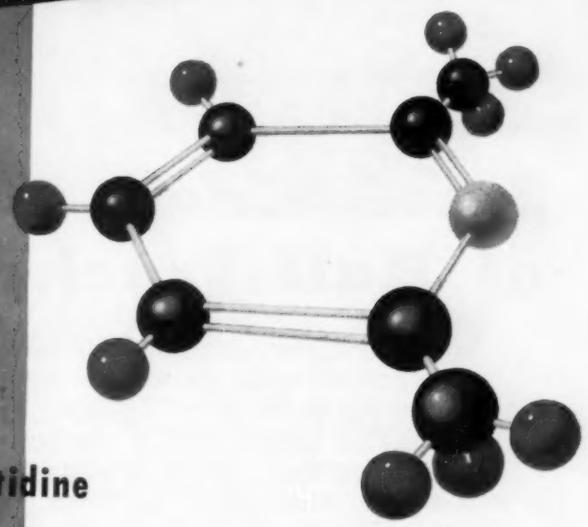

PROPERTIES (pure compound)

Molecular Weight	107.15
Freezing Point	— 6.0°C.
Boiling Point	142.9°C.
Specific Gravity	.928 at 25°C./4°C.
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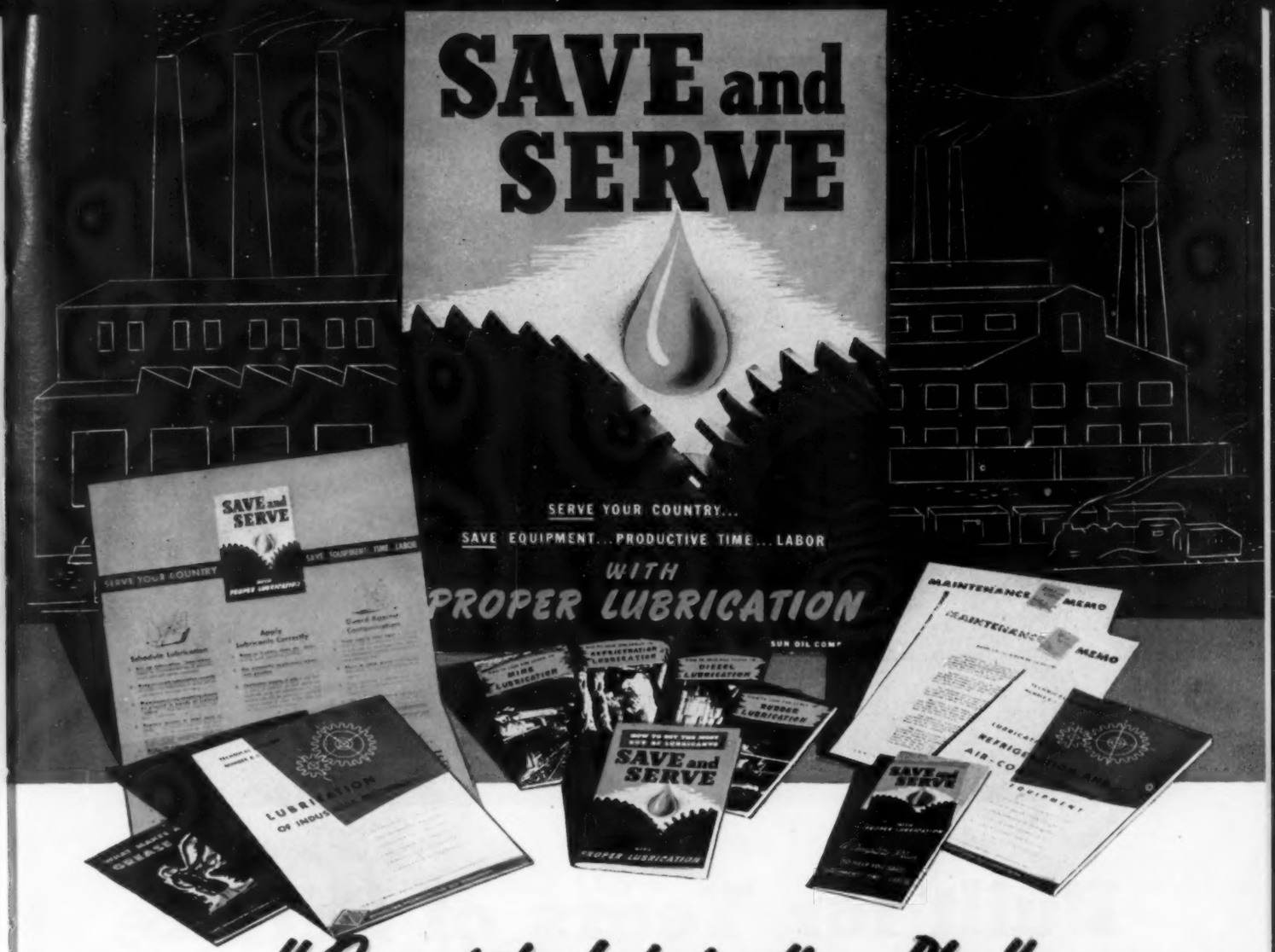

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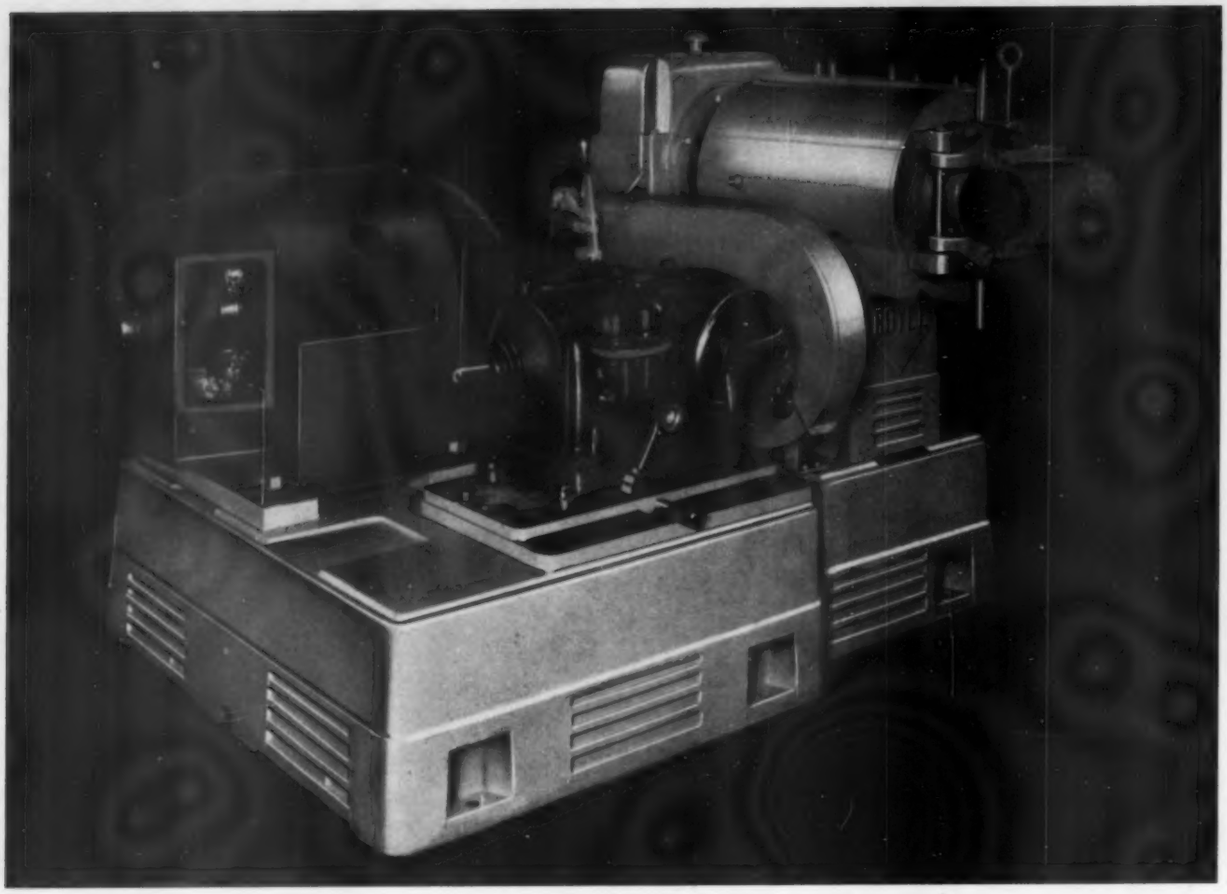

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LATEX AND ITS INDUSTRIAL APPLICATIONS (Vol. I)
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Bibliography of latex patents and literature to June, 1932.

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS (Vols. II & III)
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The RUBBER AGE

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Natural and Accelerated Light Aging of Hevea and GR-S Vulcanizates

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THE development of a satisfactory accelerated light aging test for natural and synthetic vulcanizates is an important problem for the Navy Department personnel whose job it is to maintain and improve the quality of rubber goods used by this service. Several publications on this subject have appeared which describe the work done by three Navy laboratories *(2, 4, 6)* using flaming arc irradiating units.

In one of these publications *(4)* data are presented which indicate fair correlation between accelerated light aging and sunlight aging in the case of certain synthetic rubber stocks. However, little data have been presented in these publications which show the same for natural rubber stocks. The purpose of the work reported here was to compare the effects of the flaming arc with sunlight on pure-gum Hevea vulcanizates and GR-S vulcanizates which contain a semi-reinforcing black loading.

It is generally recognized that the compounding ingredients which give the most effective protection against sunlight are paraffins or blended waxes, such as Heliozone or Sunproof. In fact, the protective action of these materials against sunlight is a phenomenon comparable in degree with the protective action of antioxidants against dark aging. Inasmuch as the practical reason for this investigation was to devise an accelerated light aging test which would differentiate between vulcanizates having good and bad resistance to sunlight, respectively, it was desirable to compound stocks for this investigation which would be similar in all respects except for content of wax.

It was recognized that the shade of the rubber sometimes influences the type of cracking which occurs when a stretched specimen is exposed to sunlight. It was decided, therefore, to include several black pure-gum Hevea vulcanizates in this study.

Note: The opinions or assertions in this article are those of the authors, and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

TABLE I

RECIPES FOR HEVEA MEDIUM-SOFT GASKET STOCKS

	A	B	C	D
Smoked Sheet	100.0	100.0	100.0	100.0
Zinc Oxide	5.0	5.0	5.0	5.0
Cottonseed Oil	2.5	2.5	2.5	2.5
Stearic Acid	1.0	1.0	1.0	1.0
Age Rite Resin D	1.0	1.0	1.0	1.0
Captax	0.5	0.5	0.5	0.5
Altax	0.5	0.5	0.5	0.5
Tuads	0.5	0.5	0.5	0.5
Sulfur	0.75	0.75	0.75	0.75
Heliozone	—	3.0	—	1.0
P-33	—	—	1.0	3.0

RECIPES FOR GR-S STOCKS

	E	F	G	H
GR-S	100.0	100.0	100.0	100.0
Pelletex	75.0	75.0	75.0	75.0
Zinc Oxide	5.0	5.0	5.0	5.0
Naftolen 510	10.0	10.0	10.0	10.0
Thionex	0.5	0.5	0.5	0.5
Sulfur	2.2	2.2	2.2	2.2
Heliozone	—	1.0	2.0	3.0

Recipes

The recipes for the pure-gum Hevea stocks and loaded GR-S stocks are given in Table I. The pure-gum stocks are identified in the table as medium-soft gasket stocks because they meet the Navy Department specification for this type of rubber *(5)*. The Hevea stocks had the same basic recipe with the following exceptions: Stock A contained no wax or black; Stock B contained wax; Stock C contained black; Stock D contained wax and black. The GR-S stocks had the same basic recipe with the following exceptions: Stock E contained no wax; Stock F contained one part wax; Stock G contained two parts wax; Stock H contained three parts wax. All of the GR-S stocks, of course, were black.

Description of Aging Unit

The accelerated light aging was conducted in the Eveready Accelerated Testing Unit, Model X-1A, manufactured by the National Carbon Company. This machine is illustrated in Figs. 1 and 2. It contains a ventilated flaming arc lamp which is operated at a potential of 50 volts and a current of 60 amperes. The lamp is shown in Fig. 3. The housing of this lamp is arranged for the installation of Corex D glass filters when desired.

FIG. 1 — Flaming Arc Testing Unit. (Courtesy, National Carbon Co.)

The Eveready Unit contains a cylindrical framework on a turntable to carry specimen holders in such a way that the exposed surface of specimens is 18½ inches plus or minus ½-inch from the arc. The turntable makes one complete revolution every two hours. A water spray is provided to wet thoroughly the entire length of each specimen for approximately 10 minutes in each revolution.

The National Carbon Company manufactures eight different types of cored carbons for use in the Eveready Unit. These carbons are listed in Table II with their relative energy outputs for various spectral zones.*

* These data were kindly given by the National Carbon Company.

TABLE II—ENERGY OUTPUT IN VARIOUS SPECTRAL ZONES FROM EVEREADY CARBON ARCS

Radiations from Arcs at 60 amperes, 50 volts A.C.

Spectral Zone		Eveready Carbons								Standard Sunlight
		Sunshine	B	C	D	E	K	U	W	
Name	*Angstrom Units*	*Microwatts per square centimeter at one meter distance*								*Microwatts per sq. cm.*
Far Ultra Violet	<3000	220	990	1,100	130	340	1,060	1,190	1,620	0.0116
Ultra Violet	3,000 to 4,000	2,200	2,080	2,080	970	1,270	2,040	1,880	2,590	1,980.
Visible	4,000 to 7,800	5,815	1,290	1,150	1,610	6,380	1,195	1,895	2,830	40,096.
Infra Red	>7800	11,865	14.340	10,600	14,280	11,470	13,405	10,835	11,030	31,904.
	Total	20,100	18,700	14,930	16,990	19,460	17,700	15,800	18,070	73,980.
		Percentage Distribution								
Far Ultra Violet	<3000	1.1	5.3	7.2	0.7	1.8	5.9	7.5	8.9	0.000016
Ultra Violet	3,000 to 4,000	11.0	11.1	14.0	5.7	6.5	11.5	11.9	14.8	2.7
Visible	4,000 to 7,800	28.9	6.9	7.7	9.5	32.7	6.7	12.0	15.6	54.2
Infra Red	>7800	59.0	76.7	71.1	84.1	59.0	75.9	68.6	60.7	43.1

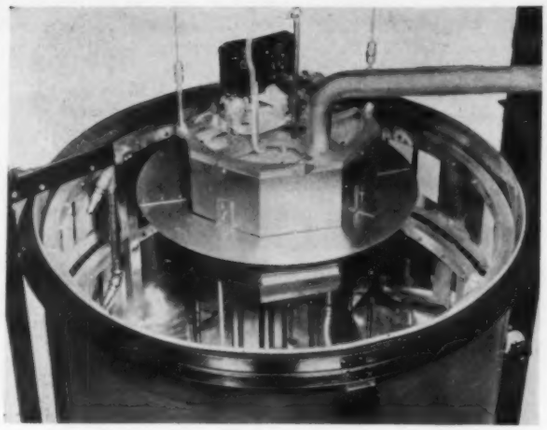


FIG. 2—Inside view of testing unit (showing paint panels undergoing test).

The Sunshine and C carbons are most commonly specified for testing rubber.

The Eveready Unit is furnished with eight removable Corex D filters surrounding the arc. These filters cut off all radiations from the arc which are shorter than 2600 Angstrom Units. By filtering out the shorter wave lengths, the similarity between the arc radiation and sunlight is enhanced since sunlight does not contain wave lengths shorter than 2900 Angstrom Units.

The sunlight aging was done on the roof of the Rubber Laboratory. The specimens were supported at an angle of 45 degrees with the horizontal and faced south.

Details of Procedure

The specimens for both the accelerated light aging and the sunlight aging were in the form of rectangular strips, 2 inches wide by 6 inches long by 0.08 inch thick. The strips were maintained at the desired elongation during exposure by means of the stretching frame shown in Fig. 4. This stretching frame, which was designed by the senior author, is described in the A.S.T.M. and Federal specifications *(1, 3)* for accelerated light aging.

Loss of tensile strength is a convenient criterion of deterioration in the case of thin specimens, such as were used in this work. Cracking and checking in the surfaces of these specimens are reflected in proportionate drops in the respective tensile strengths when the latter property is measured in the direction of stretch during exposure.

Inasmuch as this investigation lasted for a considerable period and required from time to time the preparation of new lots of test specimens, it was necessary to follow in detail a strict regimen for the preparation, exposure, and testing of the specimens in order that the results would be comparable. The compounding, milling and curing were done in accordance with the methods recommended by the A.S.T.M. It was the practice to condition the cured 6 inch by 6 inch by 0.08 inch slabs for at least one week in the dark at 82° F. in order to permit the wax, if present, to bloom to the surface.

For every exposed specimen tested, a control specimen cut from the same slab was tested. Thereby, it was hoped to eliminate discrepancies which might arise from slight variations between slabs of the same stock due to difference in age, difference in grain, or other effects. Instead of reporting the actual tensile properties after aging, the results are reported in terms of percent retention of these properties.

The details of the experimental procedure were as follows: Three 2 inch by 6 inch specimens, each cut from a separate slab of the same stock, were used for each exposure. All specimens were stretched equally

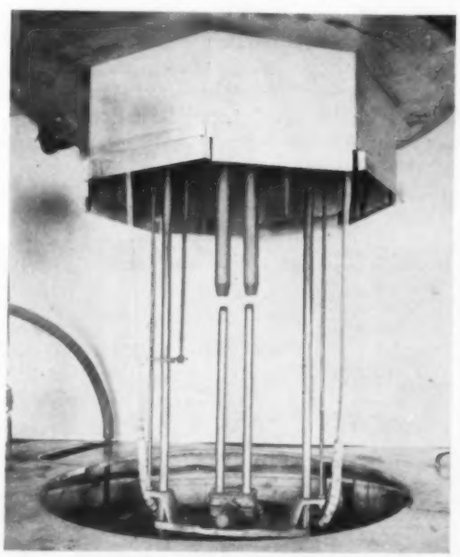


FIG. 3—Carbon lamp of the testing unit. (Arc burns between one pair of carbons at a time). This illustration, and all subsequent figure illustrations, are official U. S. Navy photographs.

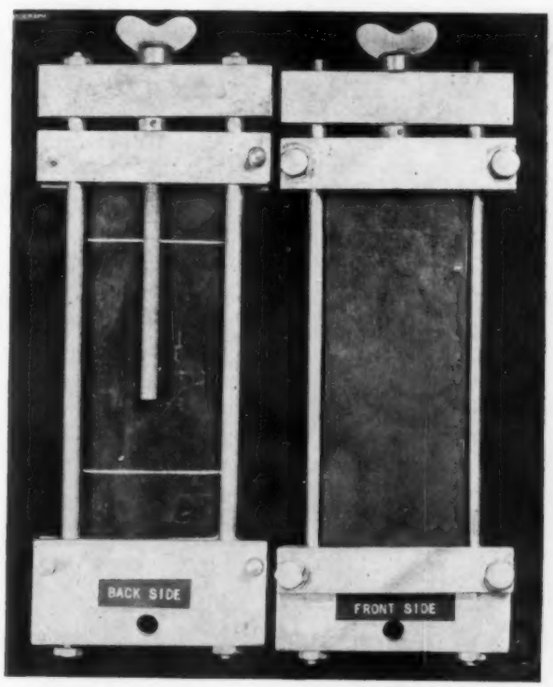


FIG. 4—Stretching frame with rubber specimen in position.

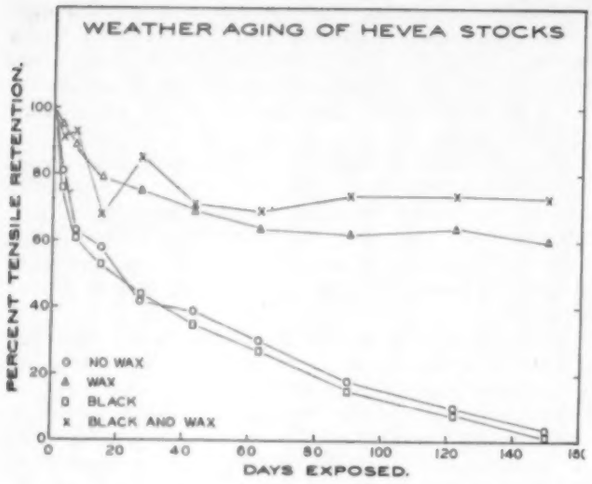


FIG. 5—Weather aging of Hevea stocks.

during exposure and were released as soon as possible after exposure. Between 16 and 48 hours after exposure, two A.S.T.M. Type C dumbbells were died from each specimen and tested for tensile properties. At the same time, two dumbbells were died from the remainder of each of the three original slabs and tested for tensile properties. Thus, six tensile tests were made on exposed specimens of each stock, and six tensile tests were likewise made on unexposed specimens of each stock for control.

Sunlight Aging

The respective sunlight resistances of the four Hevea stocks were determined in two weather aging programs. The first program extended through July, August, and September, 1941. The specimens were stretched 20 per cent during exposure and were tested only at the end of this period. The second program extended through May, June, July, August, and September, 1942. The specimens were stretched 10 per cent during exposure, and at intervals three specimens of each stock were removed and tested specifically for tensile strength.

The results of the first weather aging program on the Hevea stocks are given below:

Stock	*Critical Ingredients*	*Retention of Tensile Strength per cent*
A	None	17
B	Wax	78
C	Carbon black	12
D	Carbon black and wax	79

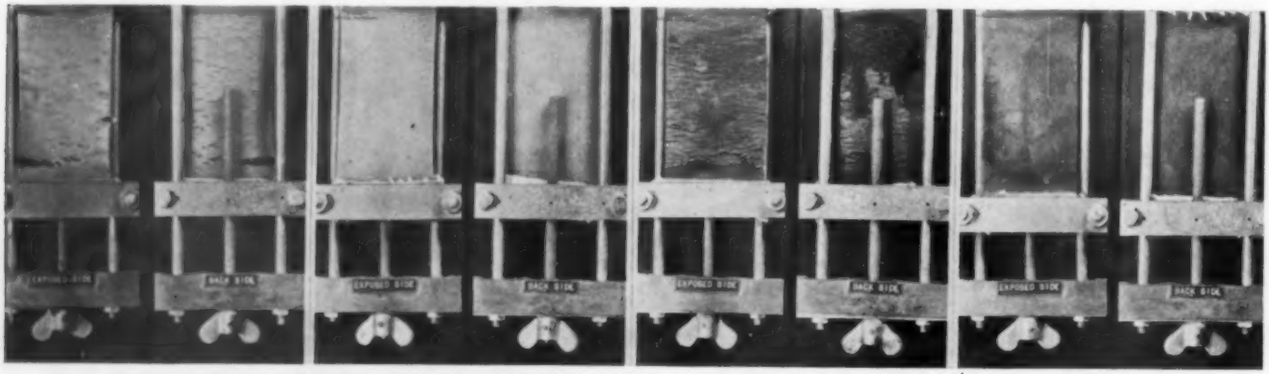
The results of the second weather aging program are plotted in Fig. 5. These plotted data and the tabulated data from the first program indicate clearly the protective action of wax against sunlight. The fact that one experiment was performed at 10 per cent elongation and the other at 20 per cent elongation seems to make no difference. The effect of carbon black was not so clearly defined as the effect of wax. In the first program the presence of carbon black had no beneficial effect; in the second program the stock containing carbon black and wax had somewhat better sunlight resistance than the stock containing only wax.

Visual evidence of the protection given by wax is presented in Fig. 6. These photographs of the stretched specimens were taken after 150 days weather aging. It will be observed that the stocks without wax were badly cracked, whereas the stocks with wax suffered only a surface crazing.

The respective sunlight resistances of the four GR-S stocks were determined in a weather aging program extending through February, March, April, May, and June, 1943. The specimens were stretched 10 per cent during exposure, and at intervals three specimens of each stock were removed and tested for tensile strength. The results of this weather aging program are plotted in Fig. 7, and the appearance of the stretched specimens after 150 days exposure is shown in Fig. 8.

It is evident from the plotted data and the photographs that the wax had a definite protective action in the GR-S stock. The degree of cracking diminished as the wax content was increased, but three parts of wax were required to eliminate cracking entirely.

After determining the resistance of the Hevea and GR-S stocks to sunlight, the next step was to find whether or not the accelerated light aging test would distinguish between the stocks in the same manner as sunlight.



Stock A (no wax or black) *Stock B (wax)* *Stock C (black)* *Stock D (black and wax)*

FIG. 6—Hevea stocks after 150 days weather aging.

Accelerated Light Aging

The variables permitted in the standard accelerated light aging test previously described are time of exposure and type of radiation. Time of exposure is not as critical as type of radiation since increasing the time of exposure generally leads only to increased differentiation between stocks having good and bad resistance, respectively. Whether or not this differentiation will occur in the same manner as it does in sunlight depends on the type of radiation employed.

Inasmuch as there are various carbons available which emit different spectra when arced, and these radiations can be further modified by the presence of Corex D filters, it is apparent that considerable experimental work had to be done in order to prove that the standard accelerated aging test either does or does not correlate with sunlight aging in the case of the eight stocks under consideration.

Experiment #1: It is shown in Table II that the W carbon arc emits the most intense radiation in the ultra violet of all the carbon arcs. The radiation from the W carbon arc, when filtered through Corex D, covers the same range as the ultra violet range in sunlight, but the filtered W arc radiation in this range is much more intense than the ultra violet in sunlight. If the deterioration of slightly stretched rubber in sunlight is actually caused by the ultra violet component, the W carbon arc in conjunction with the Corex D filters should be the best of the available carbon arc-filter arrangements for accentuating this effect.

The four Hevea stocks were stretched 20 per cent and exposed to the filtered W carbon arc radiation for 200 hours. This exposure did not crack any of the stretched specimens. The retentions of tensile strengths were as follows:

Stock	*Critical Ingredients*	*Retention of Tensile Strength per cent*
A	None	95
B	Wax	75
C	Carbon black	97
D	Carbon black and wax	98

These data are not in agreement with the results of the weather aging, nor is the fact that no cracking occurred after 200 hours exposure in agreement with

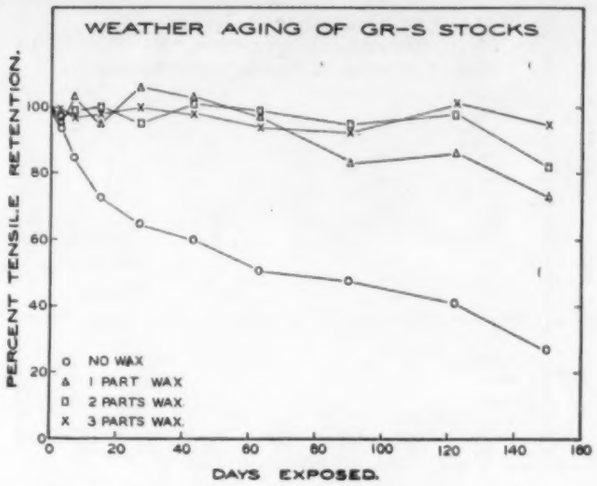
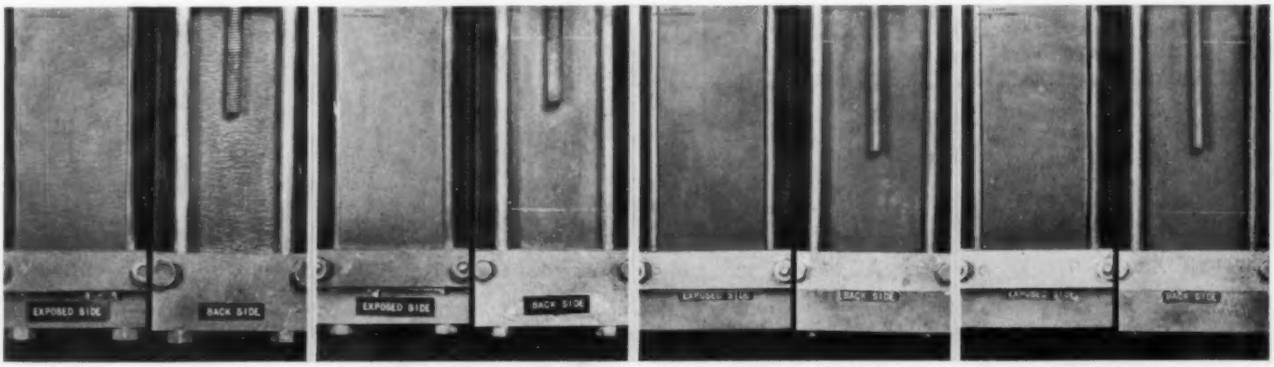


FIG. 7—Weather aging of GR-S stocks.

the effects of sunlight on the surfaces of the stocks. A summer sun caused cracks to appear on Stock C after only four days and on Stock A after 11 days. The four days exposure corresponded to not more than 40 hours of sunlight, and during much of this time the light was striking the rubber surface at an acute angle. Sunlight was apparently far more severe on the specimens than filtered W arc radiation.

Experiment #2: In view of the impotency of the fully-filtered W arc radiation, it was decided to try a semi-filtered radiation. The so-called semi-filtered radiation was obtained by removing alternate Corex D filters. Thus, the specimens were alternately exposed to unfiltered radiation and filtered radiation during each revolution of the turntable. Sunshine carbons were used for this experiment because they emit radiation which, when unfiltered, agrees better with sunlight than the unfiltered radiations from the other Eveready carbons.

The Hevea stocks were exposed at 10 per cent elongation under these conditions for various times ranging upward to 150 hours. The retentions of tensile



Stock E (no wax) *Stock F (1 part wax)* *Stock G (2 parts wax)* *Stock H (3 parts wax)*

FIG. 8—GR-S stocks after 150 days weather aging.

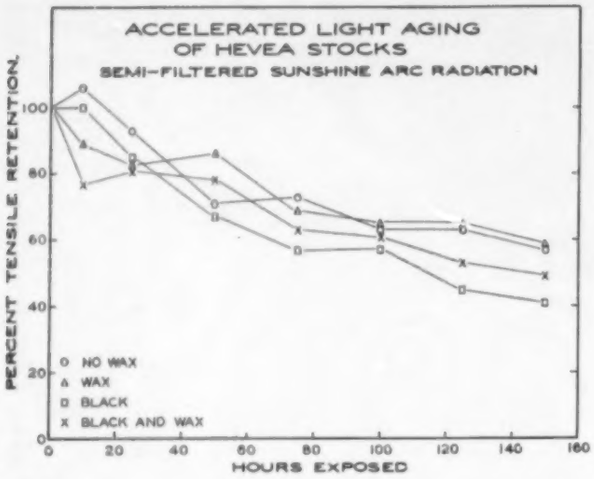


FIG. 9—Accelerated light aging of Hevea stocks (semi-filtered sunshine arc radiation).

strengths are plotted in Fig. 9. Stocks A, C, and D exhibited cracking after 50 hours exposure, Stock B after 150 hours exposure. Examination of Fig. 9 in conjunction with Fig. 5 shows that no correlation existed between the effects of semi-filtered Sunshine arc radiation and the effects of sunlight on these stocks. Moreover, from the standpoint of surface cracking, the semi-filtered Sunshine arc radiation was less active than sunlight.

Experiment #3: Having demonstrated that fully-filtered and semi-filtered radiations are not satisfactory substitutes for sunlight in their action on the Hevea stocks, the next step was to test the unfiltered radiations. The Hevea stocks were exposed to unfiltered radiations from the Sunshine, B, C, E, K, U, and W arcs, respectively. Only one exposure was conducted with each of the carbon arcs and all exposures were continued until severe cracking was obtained. All specimens were stretched 20 per cent during exposure.

The results are tabulated in Table III. It is manifest from these data that the unfiltered radiations do not correlate with sunlight in their behavior toward the Hevea stocks.

TABLE III—RESULTS OF EXPOSURES TO UNFILTERED ARC RADIATIONS

Carbon	Time of Exposure hours	Percent Retention of Tensile Strength in Hevea Stocks A	B	C	D
Sunshine	50	51	61	38	39
B	15	53	44	46	43
C	8	53	38	59	48
E	20	51	43	54	48
K	12	48	36	47	43
U	20	51	41	44	37
W	15	44	42	39	29

A—no wax or black; B—wax; C—black; D—black and wax.

Experiment #4: The GR-S stocks were subjected to two exposures in the Eveready Unit. The first exposure was to the unfiltered Sunshine arc and lasted 125 hours; the second exposure was to the unfiltered W arc and lasted 150 hours. The specimens were stretched 10 per cent in each case. The former exposure did not crack the specimens; the latter exposure caused cracks of equal severity to appear on all of the specimens after 50 hours. The effects of these exposures on retention of tensile strength are listed below.

Stock	Content of Wax	Per cent Retention of Tensile Strength—After Sunshine Arc Exposure	After W Arc Exposure
E	None	85	73
F	1 part	85	74
G	2 parts	87	76
H	3 parts	92	79

A comparison of these results with the plotted data in Fig. 5 shows that neither accelerated aging method distinguished Stock E from the other stocks in the same manner as sunlight.

It was suspected that the high temperature developed in the specimens during exposure in the Eveready Unit might be responsible for the lack of correlation with weather aging. For example, by means of a thermocouple vulcanized into the center of a specimen, it was determined that the temperature rose to 219° F. between sprayings during exposure to the unfiltered Sunshine arc. This temperature, of course, is far above any temperature obtained during exposure of rubber to sunlight, even in the tropics.

If it is assumed that the high temperature will cause the wax bloom to disappear, either by redissolving in the rubber or by being washed off while molten by the water spray, an explanation is obtained for the failure of the wax to improve the resistance of the Hevea stocks and the GR-S stocks to semi-filtered and unfiltered arc radiations. It seemed that the first object of further work should be to maintain reasonable specimen temperatures during accelerated light aging.

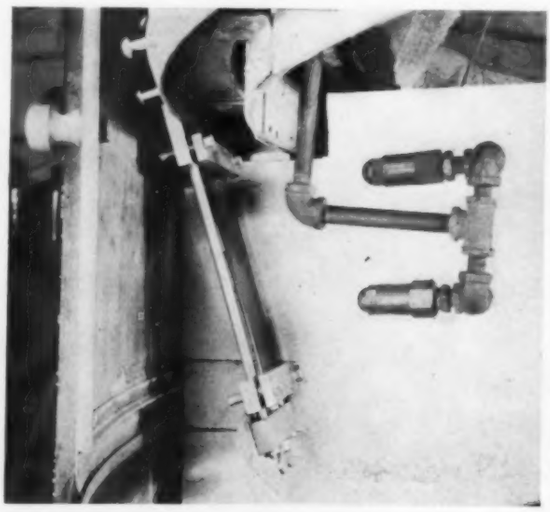


FIG. 10—Specimen in stretching frame passing before double spray nozzles.

TABLE IV—MAXIMUM TEMPERATURES BETWEEN SPRAYS WITH NEW COOLING ARRANGEMENT

	Temperature °F.												
	First Quarter			Second Quarter			Third Quarter			Fourth Quarter			
Carbon Arc	1	2	3	1	2	3	1	2	3	1	2	3	Average
Sunshine	101	90	92	91	92	91	99	104	97	120	125	—	100
B	100	134	142	129	150	145	103	101	104	100	102	111	118
C	96	123	124	104	102	108	109	111	106	132	136	139	115
D	131	120	108	95	88	101	92	90	90	123	152	155	112
E	122	152	145	144	132	147	128	113	130	124	116	116	130
K	111	146	128	141	135	134	107	103	104	104	96	99	117
U	100	103	121	91	114	102	93	98	91	94	113	—	101
W	115	117	114	95	96	96	89	88	89	96	92	93	98

Improved Procedure

In order to obtain reasonable specimen temperatures during accelerated light aging in the Eveready Unit, the number of points at which the specimens passed under spray water was increased from one to four and the number of sprays at each point was increased from one to two. The double spray nozzles were located at each quarter. A photograph of a specimen passing in front of the double spray nozzles is shown in Fig. 10.

A second change was made in the Eveready Unit to improve the cooling of the specimens. This change consisted in a reversal of the pulleys on the belt drive for the turntable. Thereby, the time for one revolution was decreased from two hours to 43 minutes, and consequently the specimens were a correspondingly shorter time between sprays.

The maximum temperatures attained by a black rubber specimen during exposure under these conditions to various unfiltered arc radiations are listed in Table IV. Three determinations at each quarter were made in as many revolutions. These data were obtained by means of a thermocouple vulcanized into the center of the specimen.

The data in Table IV indicate that the new cooling arrangement kept the specimen temperature within reasonable limits no matter what carbons were used. Although there was considerable variation in some cases between consecutive determinations at each quarter, this should not be of serious consequence since the average temperatures were quite low.

Experiment #5: In order to test the suitability of the new cooling arrangement, the four Hevea stocks and the four GR-S stocks were exposed to the various unfiltered carbon arcs for 100 hours in separate runs. The specimens were stretched 10 per cent. The results of this experiment are presented in Table V.

Correlation in Case of Hevea Stocks

These data are very interesting because they indicate correlation for the first time with weather aging in the case of the Hevea stocks. This correlation with weather aging was manifested not only in relative retentions of tensile strength but also in the appearance of the exposed specimens. Probably the best correlation from the standpoint of relative tensile retentions was obtained with the B carbon arc. The appearance of the specimens after exposure for 100 hours to this arc is shown in Fig. 11. It will be noted that the appearance of these specimens resembles the appearance of the weather-aged Hevea specimens in that the stocks without wax were badly cracked, whereas the stocks containing wax were not cracked.

No Correlation in Case of GR-S Stocks

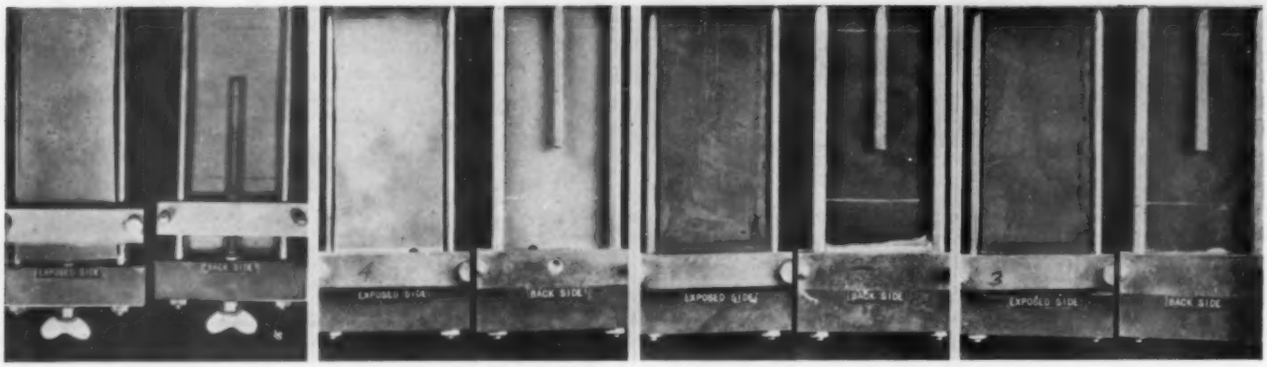
Unfortunately, the data from this experiment do not indicate correlation with weather aging in the case of the GR-S stocks. For example, after weather aging the GR-S stock without wax was clearly defined by its poor tensile retention, but after the accelerated agings this stock retained its tensile strength to the same extent, or even better than, the GR-S stock containing one part of wax. Furthermore, a decreasing amount of cracking with increasing wax content is much more evident in the weather-aged specimens (Fig. 8) than in the typical accelerated-aged specimens shown in Fig. 12.

TABLE V—RESULTS OF 100-HOUR EXPOSURES WITH NEW COOLING ARRANGEMENT

Unfiltered Carbon Arc	Percent Retention of Tensile Strength in Hevea Stocks			
	A	B	C	D
Sunshine	55	70	63	91
B	33	76	36	85
C	78	93	79	94
D	39	93	39	74
E	45	72	49	89
K	34	83	41	82
U	29	73	45	91
W	59	76	52	95

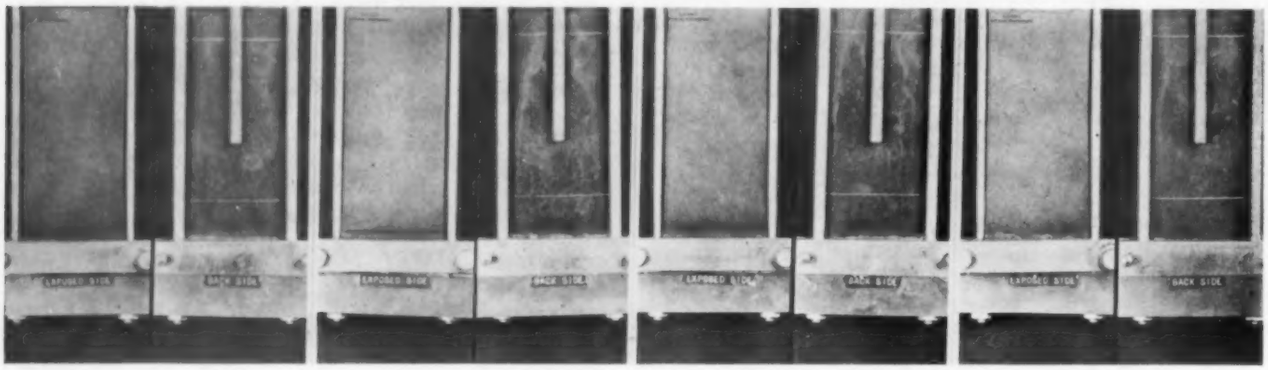
Carbon Arc	Percent Retention of Tensile Strength in GR-S Stocks			
	E	F	G	H
Sunshine	68	64	77	91
B	63	62	55	61
C	66	53	52	65
D	69	63	63	75
E	62	65	70	86
K	64	63	60	76
U	61	52	61	79
W	72	63	78	89

A—no wax or black; B—wax; C—black; D—black and wax; E—no wax; F—1 part wax; G—2 parts wax; H—3 parts wax.



Stock A (no wax or black) *Stock B (wax)* *Stock C (black)* *Stock D (black and wax)*

FIG. 11—Hevea stocks after 100 hours exposure to B carbon arc with improved cooling arrangement.



Stock E (no wax) *Stock F (1 part wax)* *Stock G (2 parts wax)* *Stock H (3 parts wax)*

FIG. 12—GR-S stocks after 100 hours exposure to E carbon arc with improved cooling arrangement.

Summary

Reviewing what has been accomplished in this work, it has been found that the standard accelerated light aging method does not correlate with sunlight, no matter what carbons or filter arrangements are used, in the cases of the pure-gum Hevea stocks and the loaded GR-S stocks which were studied. By improving the cooling arrangement in the Eveready Unit it was possible to obtain correlation in the case of the Hevea stocks, but not in the case of the GR-S stocks.

ACKNOWLEDGMENT

The authors wish to acknowledge the considerable help given in this investigation by Wallace E. Fratzke.

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Chlorinated Paraffins as Plasticizers for Synthetic Rubber

PAROIL is the trade name given to a series of chlorinated paraffins which are compatible with a variety of plastics, resins and synthetic rubbers and which offer special advantages as plasticizers for these materials. The Paroils, products of Amecco Chemicals, Inc., of Rochester, N. Y., are non-volatile, practically tasteless, and odorless. They are produced in three major grades: No. 143-5-N, with approximately 43% combined chlorine; No. 163-5-PN, with approximately 60%; and No. 170, with approximately 70%.

The Paroils vary from an amber liquid with a specific gravity of 1.17 to a soft amber-colored resin with a specific gravity of 1.36. Paroil No. 170 is a hard, brittle, amber-colored resin with a softening point of over 80° C. and with a specific gravity of approximately 1.60. Successful tests have been run with the chloroprene-type rubbers and with both vinyl polymers and polyvinyl chloride. When used in these materials, the Paroils improve oil resistance because of their insolubility in aliphatic hydrocarbons.

Industrial Rayon Corporation's high tenacity rayon tire yarn is completely processed by individual thread treatment in the course of travel from stage to stage over these reels, on which it is stretched, washed and treated.

Making High Tenacity Rayon Tire Cord

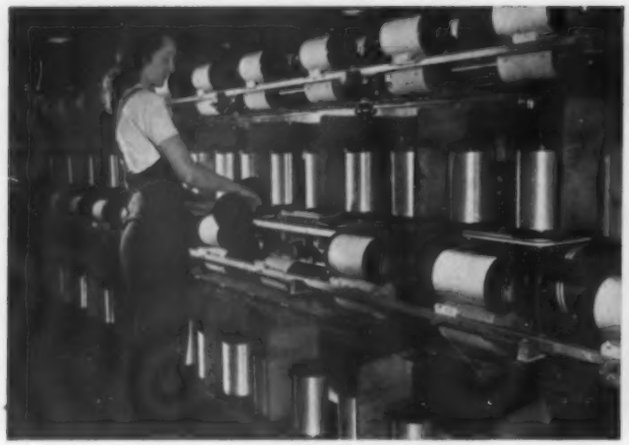
THE continuous process method of viscose rayon manufacture, introduced by the Industrial Rayon Corporation six years ago to overcome the limitations of conventional bulk processing by individual thread treatment, has enabled that company to integrate the production of high tenacity rayon tire yarn with the production of tire cord and fabric.

Spinning, twisting and weaving operations have been fully coordinated at the company's plant in Cleveland, with marked increases in production efficiency and in the quality of tire cord fabric. On the continuous process machines, 1100 denier high tenacity rayon yarn is spun, stretched, washed, treated, dried, given a preliminary twist and wound on bobbins, ready for cord twisting when it leaves the machines.

However, by conventional methods, before rayon tire

To provide the warp for weaving Tyron cord fabric, hundreds of spools of cord are placed on creels and unwound onto beams like these, which hold almost half a ton of cord.

Another view of the warping operation. The individual strands of cord can be seen passing from creels to the beams. The number of strands is determined by fabric specifications.



In the first of two twisting operations necessary to make tire cord, yarn is taken directly from two continuous process bobbins and twisted simultaneously. The two threads are wound parallel on a twist spool directly above the bobbins on this machine, which twists on two levels.

This is the second of the two twisting operations required. In this step the threads from two continuous process bobbins which were twisted and laid parallel are cable twisted into finished tire cord as they pass upward to the horizontal spools. The operator is seen feeding twisted yarn.

yarn can be twisted into cord, it must be unwound from spools or cakes and subjected to an operation generally known as slashing, which involves creeling the packages, wet-treating the yarn, stretching it and drying it in the course of travel to large beams on which it is wound. Industrial's elimination of the slashing operation not only makes possible a more efficient method of cord production but twisting from bobbins instead of beams also provides larger packages of superior tire cord.

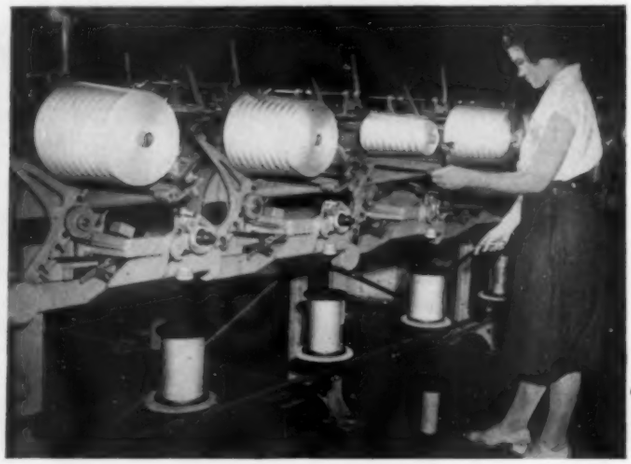
In the making of cord, two twisting operations are involved. In the first, yarn from two continuous process bobbins is twisted simultaneously while being drawn upward and the two threads wound parallel on a twist spool. In the second operation, these parallel strands are cable twisted into Tyron cord. Cord for use in the plant's own Weaving Department is transferred directly from the twist spools to warp beams from which tire cord fabric is then woven.

The individual beams used by Industrial Rayon carry nearly half a ton of cord apiece and are arranged in two tiers, with a multiple number of beams on the warper creel serving each loom. In moving toward the loom, the individual strands are interlaid so that uniform tension can be maintained and a tighter, more uniform roll produced. The finished tire fabric comes from the looms in rolls up to 1000 yards long.

Industrial Rayon is now producing 11,000,000 pounds of high tenacity rayon annually. Expansion plans call for an eventual total of 42,000,000 pounds.

Cord for the tire fabric is fed into each loom from a number of beams simultaneously, and is loosely interlaced with a thin filling thread to form Tyron cord fabric. In moving toward the loom, individual strands from the several beams are interlaid so that uniform tension can be maintained and a tighter, more uniform roll produced.

Tire manufacturers who process cord instead of fabric receive Tyron cord in giant cones weighing approximately 18 pounds. The operator shown here has just placed a full spool of cord in position, preparatory to cone winding on a special type of coning machine installed for this purpose. All photos by courtesy of Industrial Rayon Corp.



Division of Rubber Chemistry Meets in New York City on April 26, 27, 28

THE Spring Meeting of the Division of Rubber Chemistry, A.C.S., as previously reported, will be held in New York City on Wednesday, Thursday and Friday, April 26, 27 and 28. All sessions will be held at the Hotel Commodore, while the divisional banquet will also be held at the Commodore, in the main ballroom, on Thursday evening, April 27. Thirty-two technical papers will be presented. Following the successful procedure instituted at the last meeting, the afternoon of the second day—Thursday—has been left free so that members and guests will have some time for consultations, meetings, friendly gatherings, etc.

Because of the large attendance anticipated at the meeting, all those planning to attend are urged to send "Advance Registrations." Forms for this purpose have already been mailed to the complete membership of the Rubber Division, while special forms appeared in the March issues of both the *India Rubber World* and RUBBER AGE. In all cases, these "Advance Registration" forms are to be sent to Walter Geldard, c/o Naugatuck Chemical, 1230 Sixth Ave., New York 20, N. Y. No money of any kind is to be sent with these forms, the sole purpose of which is to facilitate registrations and the distribution of lapel badges.

As stated, the banquet will be held on Thursday evening, April 27. Although no major speaker will be presented, a full program of exceptional entertainment is promised. Tickets will sell at $5.00 each. No banquet tickets will be sold in advance of the meeting itself, but the committee in charge of arrangements has decided that only one banquet ticket will be sold to each registrant at the meeting up to 3:00 P.M. Wednesday afternoon. Between the hours of 3:00 to 5:00 P.M. on the same day, tickets will be sold to non-registrants wishing to attend the banquet, providing the maximum capacity has not been reached by such time. Tickets for an Alpha Chi Sigma luncheon, to be held on Friday afternoon, will also be available near the registration desk.

In addition to the presentation of the 32 technical papers scheduled, the meeting will feature an introductory talk by Harold Gray, of the B. F. Goodrich Co., Chairman of the Division, to be given on Wednesday morning. The regular business meeting is scheduled for 10:55 A.M. Friday morning.

The committee in charge of arrangements for the Spring Meeting is headed by Harry Outcault (St. Joseph Lead) as chairman, assisted by the following: Walter J. Geldard (Naugatuck Chemical), Fred Conover (Naugatuck Chemical), Joseph Breckley (Titanium Pigment), Simon Collier (Johns-Manville), M. F. Davis (Huber), E. S. Kern (Vanderbilt), I. E. Lightbown (Stanco Distributors), B. B. Wilson and R. G. Seaman (*India Rubber World*), and Peter P. Pinto (RUBBER AGE).

Program of the
DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY
Hotel Commodore—New York City
April 26, 27 and 28

Wednesday Morning—April 26

11:00 A.M.—Introduction, by Harold Gray (Goodrich), Chairman.
11:10 A.M.—Technical Session.

Wednesday Afternoon—April 26

2:00 P.M.—Technical Session.

Thursday Morning—April 27

9:30 A.M.—Technical Session.

Thursday Afternoon—April 27

No Papers Scheduled.

Thursday Evening—April 27

6:30 P.M.—Divisional Banquet, Main Ballroom, Hotel Commodore.

Friday Morning—April 28

9:30 A.M.—Technical Session.
10:50 A.M.—Business Meeting.

Friday Afternoon—April 28

1:30 P.M.—Technical Session.

Abstracts of the scheduled papers, together with their authors and the latter's company affiliations, follow herewith:

ABSTRACTS OF PAPERS

Wednesday Morning—April 26

11:10 A.M.—Preparation and Properties of Vulcanized Acrylic Resins, Copolymers of Ethyl Acrylate and Allyl Maleate. *W. C. Mast, Lee T. Smith and C. H. Fisher (Eastern Regional Research Laboratory, Department of Agriculture, Philadelphia, Penna.).*

Rubber-like materials were made by copolymerizing emulsified ethyl acrylate with small proportions of allyl maleate and vulcanizing the resulting unsaturated acrylic resins. As little as 1% of allyl maleate gave copolymers that could be vulcanized readily with sulfur and accelerators and with certain other agents in the absence of sulfur. Acrylonitrile (preferably about 6%) had a beneficial effect, possibly because of its tendency to decrease cross-linkage.

Ammonium persulfate was preferable to three other oxidizing agents as a polymerization catalyst; a small amount sufficed. With this catalyst, polymerization proceeded smoothly. Benzoyl peroxide was also effective as catalyst, but it produced properties, such as insolubility and toughness, sometimes attributed to cross-linkage. Although not so active as benzoyl peroxide, hydrogen peroxide was moderately satisfactory. Sodium perborate had no particular advantage.

Properties of sulfur-cured vulcanizates depended on the content of carbon black (Furnex Beads). As carbon black was increased from 15 to 100 parts per 100 parts of the

copolymer, ultimate elongation decreased, hardness increased, and the brittle point was raised. A mixture of Micronex and Furnex Beads increased the tensile strength and decreased the elongation without hardening the vulcanizate or raising its brittle point.

Non-sulfur vulcanization methods gave promising results. Combinations of quinone, dioxime, quinone dioxime dibenzoate, red lead, and lead peroxide produced vulcanizates with considerably higher tensile strength and somewhat greater hardness than did sulfur. When the copolymers were compounded with benzoyl peroxide, vulcanization or curing occurred in 10 to 20 minutes at about 100° C. The peroxide-cured products were soft and elastic.

The vulcanized acrylic resins described were resistant to oils, solvents, oxygen, and heat, presumably because of their saturated character. Most of them had a moderately high brittle point (—10° to —20° C.), but it could be lowered by blending with certain other synthetic rubbers. The soft and rubbery vulcanizates had a tensile strength and an ultimate elongation of approximately 1250 pounds per square inch and 900%, respectively; whereas some of the harder products had a tensile strength of over 2000 lbs./sq. in. and much less elongation.

11:30 A.M.—"Lactoprene," A New Synthetic Rubber: Preparation and Properties of Vulcanized Acrylic Resins. *C. H. Fisher, W. C. Mast, C. E. Rehberg and Lee T. Smith (Eastern Regional Research Laboratory, Department of Agriculture, Philadelphia, Penna.).*

Acrylic ester copolymers having vulcanizable unsaturation were prepared by polymerizing methyl acrylate, ethyl acrylate, and similar acrylic esters with small quantities of poly-functional monomers, such as butadiene, isoprene, and allyl maleate. The resulting copolymers were soft and easily milled with standard rubber equipment. Carbon black, sulfur, zinc oxide, stearic acid, and accelerators were milled into the acrylic copolymers, and the resulting products were cured and molded into test specimens. The vulcanizates were rubber-like in appearance and feel and had tensile strengths up to 1800 pounds per square inch. In most instances the ultimate elongation was 200 to 800%. These vulcanized acrylic resins should be useful for several purposes in their present form, and it is expected that further research will effect improvements in their properties and increase their usefulness. Through lactic acid as an intermediate, several abundant carbohydrates can be converted into approximately an equal weight of vulcanized acrylic resins. Because of the key role played by lactic acid in this transformation, the name "Lactoprene" is proposed.

11:50 A.M.—Electron Microscope Studies of Natural and Synthetic Rubber Fibers. *C. E. Hall, E. A. Hauser, D. S. leBeau, F. C. Schmitt and P. Talalay (Massachusetts Institute of Technology, Cambridge, Mass.).*

Hevea rubber fibers suitable for observation in the electron microscope were prepared from thin films produced by spreading rubber solutions and dispersions on a water surface. Also included in the results are observations on guayule, Cryptostegia, balata, neoprene, and Buna S. Unvulcanized Hevea rubber was separated into the "sol" (ether soluble) and "gel" (ether insoluble) fractions. Electron micrographs of the sol fraction show fibers bearing many large spherical nodules along their length. The spherical shape of the nodules is strongly suggestive of fluid droplets. The gel fraction shows practically none of these fluid regions, but tends to form closely branched networks of extremely small fibers. Fibers in width from 100-400 Å have a characteristically beaded appearance which may be related to the state of aggregation of the isoprene chains. When pale crepe or smoked sheet is worked on the mill, the cross-linked networks of the "gel" fraction disappear and the milled material takes on the typical morphology of the "sol." Vulcanization of the milled material in solution has the effect of producing cross-linked networks of fine fibers very similar to those obtained from the "gel" fraction.

Unvulcanized and vulcanized rubber compounds containing carbon black were examined. The location and distribution of the carbon black in rubber particles, films, and fibers suggest some ideas relating to reenforcement phenomena.

Wednesday Afternoon—April 26

2:00 P. M.—Effect of Milling on the Properties of Hevea and Buna Rubbers. *W. B. Wiegand and H. Braendle (Columbian Carbon Co., Brooklyn, N. Y.).*

The superior cut-growth resistance of Hevea tread stocks over similar GR-S tread compounds is ascribed in part to the relaxation and lengthening of the natural product when subjected to severe dynamic flexure as contrasted with the failure of GR-S to relax and lengthen. GR-S is further handicapped by its original shortness. Ways and means other than the use of softeners were, therefore, sought to overcome these shortcomings. This led to a study of the behavior of Hevea and some of the synthetic polymers under prolonged and repeated milling. A method of processing GR-S which lengthens it with resultant improvement in resistance to cut growth and heat embrittlement is described.

2:20 P.M.—Structural Features of Buna S (GR-S) in Relation to Physical Properties. *A. R. Kemp and W. G. Straitiff (Bell Telephone Laboratories, Murray Hill, N. J.).*

The non-symmetry in the chain structure of GR-S hydrocarbon is discussed in its relation to the prevention of crystallization and the impediment of cross-linking during vulcanization. This lack of chain symmetry is put forward to account for the poor quality of GR-S vulcanizates in comparison with corresponding vulcanizates prepared from natural rubber.

Fractionation data on a regular benzene-soluble crude GR-S shows the presence of an objectionable broad range of polymer sizes. It is shown that the lowest molecular weight polymer fractions in GR-S are not chemically bound in the vulcanizate, but remain soluble in chloroform. By removing most of this low polymer from GR-S it is shown that the chloroform extract of its vulcanizate decreases accordingly.

Vulcanizates were prepared from high and low molecular weight fractions of GR-S. The high fractions were very tough, dry, and difficult to handle on the mill; whereas the lower molecular weight fraction was very soft and sticky. The tensile strength of the vulcanizates from the high fraction was somewhat higher than for the whole polymer, but the modulus was considerably increased. In the case of the low molecular weight polymer both the tensile and modulus values were much lower.

Vulcanizates prepared by mixing natural rubber and gutta percha hydrocarbons show lower strength than either of the hydrocarbons separately tested in the same formula.

2:50 P.M.—A GR-S Vulcanization Catalyst. *A. A. Somerville (R. T. Vanderbilt Co., New York, N. Y.).*

A metal has been found which acts as a catalyst in the vulcanization of GR-S. Many chemical compounds can be made from this metal, nearly all of which act to speed vulcanization. Detailed data are given, showing the effect of many of these compounds.

3:30 P.M.—Heat Aging of GR-S Stocks. *G. M. Massie (Harrison & Morton Laboratories, Inc., Cuyahoga Falls, Ohio) and A. E. Warner (C. P. Hall Co., Akron, Ohio).*

Data are presented showing that a mixture of GR-S, EPC black, and softener develops tensile strength and undergoes stiffening on heating in the air oven at 250° F. The change in tensile strength, elongation, and modulus is shown. The resistance of GR-S vulcanizates to air oven aging was investigated. Simple vulcanizates containing persistent and non-persistent accelerators with and without added antioxidant are compared. It is shown that the use of a non-persistent accelerator gives improved maintenance of physical properties on aging 24 hours in the air oven at 250° F. Lower sulfur level and the addition of an antioxidant show additional improvement. The persistent accelerators contribute to "marching modulus"; while the non-persistent types minimize this effect. Tests are included showing the effect of varying sulfur and zinc oxide in a stock containing a non-persistent accelerator. Physical properties, before

and after aging 24 hours in the air oven at 250° F., of a typical GR-S tread stock containing persistent and non-persistent accelerators are shown. The change in physical properties other than tensile strength is reported. Particular attention is paid to the maintenance of elongation and tear resistance on heat aging.

3:50 P.M.—Effect of Atmospheric Humidity during Storage of Uncured Stock on Stress-Strain Characteristics and Rate of Cure in Testing of GR-S. *F. E. Rupert (Rubber Service Division, Monsanto Chemical Co., Akron, Ohio), and F. W. Gage (Columbia Chemical Division, Pittsburgh Plate Glass Co., Barberton, Ohio).*

Samples of GR-S from three sources showing on analysis zero soap content, 0.70% soap content, and ordinary soap content of about 0.18% show increasing moisture absorption when exposed to high humidity, which is generally in proportion to the soap content of the GR-S. This may amount to as much as 2.6% in 14 days for a GR-S with a high soap content. This absorption takes place to a lesser degree in high black compounded stocks when exposed to atmospheres of high humidity. With a high soap GR-S compound this amounts to about 1.4%.

Stocks exposed to atmospheres of zero relative humidity show a retardation of rate of cure with length of exposure, and this is more pronounced with stocks from high soap content GR-S. Stocks exposed to atmospheres of high humidity show an increase in the rate of cure with length of exposure which may amount to as much as 90% with 100% relative humidity and an exposure of 14 days.

The percentage of moisture absorbed by a given stock to determine whether the rate of cure is to be retarded or increased probably varies with the formula and the make-up of the original GR-S. That soap content of GR-S is one of the deciding factors is indicated by this study of the three types of GR-S.

These results are in accord with work of the Carbon Black Nomenclature Committee on the effect of moisture in carbon black on the properties of GR-S and results of investigations on rubber compounds in 1927 by the physical testing committee of the A.C.S. Rubber Division.

4:10 P.M.—Effect of Moisture on the Curing Rate of GR-S. *W. B. Wiegand and H. A. Braendle (Columbian Carbon Co., Brooklyn, N. Y.).*

As GR-S came into general use, the variability of its curing rate represented a serious handicap. Shipments from different plants and even from the same plant varied widely. There was also evidence of a change in curing rate on storage of mixed stocks.

Moisture content of the raw polymer is shown to correlate well with its curing rate. Excessively dry and hence slow-curing polymers can be accelerated by moisture addition. Soap and other water soluble impurities do not appear to be the cause of curing rate fluctuations. The changes in total moisture content of a GR-S tread compound incident to changes in the moisture content of the carbon black are shown not to affect cure.

Conditioning of mixed stocks to increase their moisture content accelerates cure, and at 0.5 to 1.0% moisture on a tread compound curing rate even as between polymers from different plants and with differing soap contents is reasonably well stabilized. Since such conditioning is not generally feasible in production, an alternative method of cure stabilization is suggested.

4:30 P.M.—A Basic Compounding Study of Carbon and Non-Carbon Pigments on GR-S. *Alan R. Lukens (Thompson, Weinman & Co., Inc., Cambridge, Mass.).*

The work of Amon and Wilkes reported early in 1943 indicated the co-use of two pigments gave a wider choice of stress-strain results than the use of carbon black as the sole pigment in GR-S. Their work suggests the dispersion of the finer blacks may be aided by the co-use of a selected non-carbon pigment. We have confirmed and extended their work. A wide range of proportions of the same black and non-carbon pigment yielded GR-S vulcanizates testing up to 3200 p.s.i. and elongations from 200% to 700%. These were achieved in a simple formula, one which may be further modified by various softener and curing agents.

The variety of results has permitted drawing of bilinear and trilinear graphs which predict a flexible choice of stress-strain characteristics. Also easily obtained from these graphs, by using market prices, is a rapid calculation of volume costs.

Other non-carbon pigments, as magnesia, zinc oxide, titanium oxide, silica, diatomite, calcium silicate, barium sulfates, clay, and various types of whitings, have been compounded with and without the carbon black. From this work some interesting facts were discovered, such as tortional hysteresis being a characteristic of particulate surface and structure rather than particle size or specific surface area.

Thursday Morning—April 27

9:30 A.M.—The Reenforcement of GR-S With Zinc Oxide. *H. C. Jones (New Jersey Zinc Co., Palmerton, Penna.).*

The experience accumulated in compounding zinc oxide in natural rubber has been of little aid in realizing satisfactory properties with zinc oxide in GR-S. The reenforcing properties of zinc oxide in GR-S are influenced to a much greater degree by the proper balance of accelerators, softeners, and sulfur than natural rubber compounds with zinc oxide. The specific effects of these compounding ingredients on high zinc oxide GR-S compounds are reviewed.

A great many experimental elastomers of the butadiene-styrene type have been evaluated with zinc oxide. From the standpoint of zinc oxide reenforcement, the most striking effect is produced by the amount and nature of the organic acid portion in the rubber. Elastomers low in fatty acid, for example, develop much higher stress-strain properties than the regular polymer containing approximately 6% fatty acid. Similarly, a rosin soap polymer has been found distinctly superior to GR-S when compounded with zinc oxide.

The combination of accelerator and sulfur has a major influence on the stress-strain properties of high zinc oxide compounds. The inorganic accelerator, magnesia, in conjunction with a small amount of a fugitive accelerator has yielded satisfactory stress-strain properties. An improved formulation was found in a combination of Trimene base, magnesia, and a coumarone indene resin. Laboratory tests indicate that these materials with 15 volumes of zinc oxide will yield a compound of distinct merit in respect to stress-strain and heat build-up characteristics.

9:50 A.M.—Pigment Incorporation in GR-S through Latex. *W. McMahon and A. R. Kemp (Bell Telephone Laboratories, Murray Hill, N. J.).*

Investigation of the relation between the characteristics of various fillers and their reenforcing properties in GR-S has shown that the particle size of the filler is the most predominant characteristic associated with its reenforcing ability. In a quantitative way, however, several exceptions to this rule were observed in milled GR-S stocks. Fine zinc oxides and whitings do not yield compounds with the physical properties which their particle size and distribution indicate they should in comparison with carbon blacks and clays. Since it appeared that this was due to lack of proper dispersion of these fillers in the elastomer, means were sought to obtain more complete dispersions of fillers in GR-S. To attain this, a water dispersion of pigment was mixed with GR-S latex, and pigment and polymer were coagulated simultaneously.

The process has been employed with zinc oxides, calcium carbonates, and carbon blacks, and compounds prepared with such masterbatches have all had tensile strengths and moduli superior to the corresponding mill mixed compounds. Other properties measured are hysteresis, cut-growth resistance, heat build-up, and electrical characteristics, and again the latex dispersed compounds were found to be superior in general to mill dispersed.

This work indicates that through incorporation of reenforcing pigments in GR-S by coagulation with the polymer in the latex stage, substantial improvements in stocks can be realized; besides, an increase in the productive capacity of present rubber processing machinery and a large saving in power would result.

10:10 A.M.—Some Factors Influencing the Processability of GR-S. *A. M. Neal and P. Ottenhoff (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

The effect of various temperatures of milling on the rate of break-down of GR-S has been studied. The effect of a chemical plasticizer (RPA No. 5) on the plasticization of GR-S under these same conditions has also been followed. It is shown that in the absence of the chemical plasticizer temperature has only a slight effect upon the plasticity, but a very pronounced effect upon the recovery. Increased temperatures of milling are accompanied by a marked increase in recovery, and fairly prolonged periods of milling are required to reduce this to its original value. In the presence of the chemical plasticizer, however, increasing temperature of milling tends to increase the rate of break-down, and the recovery shows a steady decrease from its original value. At milling temperatures of 158° to 190° F. between 1% and 2% of RPA No. 5 are required to eliminate completely the maximum in the, recovery-time of milling, curve.

GR-S plasticized in the absence of a chemical plasticizer tends to be unstable and after short storage at room temperature, decreases in plasticity and increases in recovery. This phenomenon is more pronounced the higher the temperature at which the GR-S was milled, and polymer milled at 121° C. (250° F.) had a recovery, after two weeks' storage at room temperature, higher than the original unmilled polymer from which it was produced. The use of chemical plasticizers overcomes this instability, and even polymers which have been broken down at high temperatures in the presence of RPA No. 5 show only a very slight change in plasticity and recovery on prolonged storage at room temperature.

10:30 A.M.—Alkyl Phenol Sulfides as a Class of Vulcanizing Agents. *G. M. Wolf, T. E. Deger, H. I. Cramer and C. C. deHilster (Sharples Chemicals, Inc., Philadelphia, Penna.).*

A search for agents to impart tack to the butadiene copolymer types of synthetic rubber has revealed that the alkyl phenol sulfides are not only effective for this purpose, but are also active vulcanizing agents for a variety of elastomers. A compounding survey of this new class of vulcanizing agents has shown that sulfides of this type effect the vulcanization of natural rubber, and butadiene copolymers with styrene (GR-S) and acrylonitrile (Buna N). The rates of vulcanization were of the same order of magnitude as those realized with sulfur, and the vulcanizates with GR-S and Buna N types were superior in several critical properties. In neoprene these agents appear to function as accelerators of the rate of cure. They did not prove adaptable to Butyl Rubber.

A number of the phenol sulfides, representing the following variations in molecular structure, (1) size, number, and configuration of the alkyl groups, (2) types of sulfur linkage, and (3) sulfur content, have been evaluated in the butadiene copolymers. All sulfides tested functioned as tackifiers for GR-S, a number being outstanding in this property. All were less effective for this purpose when used in the Buna N types. p-tert-amylphenol-disulfide of approximately 23% sulfur content was found to be the most effective of all types tested as a vulcanizing agent for GR-S. The same type of sulfide containing approximately 28% sulfur proved to be the one best adapted to the Buna N polymers.

Comparative compounding tests were run on the p-tert-amylphenol-disulfide of 23% sulfur content and sulfur in GR-S stocks loaded with a range of volumes of EPC, SRF, and FT carbon blacks. Vulcanizates obtained with this sulfide were superior to sulfur vulcanizates in (1) tensile strength, normal and aged, as well as at 100° C., (2) modulus, markedly less increase upon aging, (3) elongation, particularly noteworthy after aging, (4) tear resistance, and (5) resistance to flex-crack growth, at room temperature, at elevated temperatures, and after aging. The enhancement of tensile strength and elongation was greatest in the case of the stocks containing FT black. The sulfide vulcanizates proved to be deficient in (1) rebound resilience, (2) heat build-up, and (3) compression set. These deficiencies can be compensated for to some degree by the addition of softeners and plasticizers. This sulfide was also evaluated in a representative GR-S tire tread stock.

As in the case of stocks containing FT black, the use of the alkyl phenol sulfides improves the dispersion of various mineral fillers in GR-S, as evidenced by increases in tensile strength and elongation.

Attempts to elucidate the mechanism of vulcanization with this class of organic sulfides have not been successful. Two mechanisms have been postulated, (1) labile sulfur is released under the conditions of cure, and (2) the entire phenol-sulfide molecule enters into the vulcanization reaction.

11:00 A.M.—Vulcanization of GR-I. *F. P. Baldwin, R. L. Zapp and L. B. Turner (Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).*

The vulcanization of GR-I has been studied with respect to accelerator type and concentration, sulfur concentration, and the activation effect of the commonly used zinc oxide and stearic acid. This study indicates the proper choice of accelerator-sulfur ratios for a standard GR-I compound and further shows that stearic acid has no activating effect, whereas zinc oxide exerts a marked effect. It is also shown that the quantity of zinc oxide necessary for cure activation is relatively small and that with this amount present reversion takes place. An excess of zinc oxide reduces the reversion tendency of the vulcanizate. Tests on vulcanizate stability as affected by continued cure in the press and in open steam at 320° F., showed that the degradation was accelerated by the steam. Some possible reasons are given for this. The vulcanization time-temperature relations of several accelerators in a standard GR-I compound are included. Comparable cure states were measured by observing the time to attain a definite modulus value. The data obtained indicate that of the accelerators tried the metal salt derivatives exhibit the lowest vulcanization coefficients.

11:30 A.M.—An Improved Method for the Control of the pH of Neoprene Latex. *H. K. Livingston and R. H. Walsh (E. I. du Pont de Nemours & Co., Rubber Laboratory, Wilmington, Del.).*

The neoprene latices, like rubber latex, are set to a gel under certain conditions by the addition of delayed acid liberating agents, such as Na_2SiF_6, CaF_2, NH_4NO_3, or the nitroparaffins. The time required for the latex to gel is related to its hydrogen ion concentration. Too slow a gelation time is undesirable since it causes uneven formation of the gel. Owing to its high caustic content and the presence of stabilizing agents, neoprene latex behaves like a strongly buffered solution of high pH. A reduction in the pH of neoprene latex is caused by the acid liberated from the gelling agent, but the action occurs only slowly. Neutralization of the buffer by the addition of weak acids or by strong acids and amphoteric stabilizing agents is not practical, since their use is accompanied either by excessive dilution of the latex, coagulation, or the need of large amounts of gelling agent.

A method, using a new agent, is described for reducing the pH of latex. It has none of the disadvantages of the other methods and has the advantages of increasing the sharpness of coagulation and decreasing the variations in gelling time. Its use in neoprene froth sponge manufacturing and other commercial processes is discussed.

11:50 A.M.—Mixtures of Acrylonitrile-Butadiene Copolymers With Plasticized Polyvinyl Chloride. *R. A. Emmett (B. F. Goodrich Co., Akron, Ohio).*

Mixtures of acrylonitrile-butadiene copolymers (Hycar OR) with plasticized polyvinyl chloride (Geon No. 102) have been prepared covering the range of concentrations of polyvinyl chloride from 0% to 100%. These combine, in varying degrees, the sunlight, ozone, and aromatic solvent resistance of the polyvinyl chloride with the oil resistant and thermosetting properties of the Hycar OR. A favorable combination of properties was found with a mixture of 75% Hycar OR-15 and 25% Geon No. 102. Comparative compounding data are given on Hycar OR-15 and a blend of 75 parts Hycar OR-15, 25 parts Geon No. 102, and 25 parts tricresyl phosphate in typical compounds. These data show that besides its superiority in sunlight and ozone, the mixture has improved resistance to tearing, flex cracking, and aging as compared with Hycar OR-15.

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12:10 P.M.—Vinyl Butyrals in the Rubber Industry. *D. S. Plumb (Plastics Division, Monsanto Chemical Co., Springfield, Mass.).*

The vinyl butyrals are elastomeric plastics coming into widespread use in coating fabric, manufacturing pure gum film, and preparing miscellaneous extruded and molded materials. Their technology is remarkably similar as regards processing to that of rubber or reclaimed rubber. The chemistry of the formation of these resins and the results of development work on their compounding are given in some detail. Included are the effect of certain types of compounding ingredients on the physical properties and a discussion of the mechanism of "vulcanizing" the resin. Detail physical data on laboratory compounds are listed as well as a general description of the techniques employed by the rubber processor in handling these plastics.

12:30 P.M.—A Method for Predicting the Volume Increase of Perbunan Compounds in Petroleum Products. *R. M. Howlett (Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).*

In the formulation of stocks of oil-resisting synthetic rubber it is desirable to know the approximate volume increase of the proposed compound after immersion in various petroleum products. It has been previously shown that the swell of synthetic rubber compounds depends on the dilution of the synthetic rubber by fillers. This relation (1) has been extended to include the effect of extractable softeners (2) on the compound.

$$V = \frac{KP}{100} \qquad (1)$$

$$V = \frac{(KP)}{(100)} - ES \qquad (2)$$

where V = % volume increase
K = % volume swell of polymer in compound
P = % polymer by volume in compound
E = extract coefficient
S = % softener by volume in compound

Experimental evidence is presented to show the validity of these equations for data obtained on compounds made from Perbunan.

Data on per cent polymer swell are given for several fuels and lubricants. Similar data are presented for extract coefficients of various commonly used Perbunan softeners.

The relations necessary for volume increase calculations have been incorporated into three graphs. Thus, using available polymer swell and extract coefficient data, the swell of Perbunan compounds may be readily calculated from these graphs. This method of calculation of volume increase should be a valuable tool for the compounder and should serve to reduce the work required to establish new compounds.

12:45 P.M.—Swelling of Synthetic Rubbers in Mineral Oils—Effect of Temperature and of Aniline Point. *P. O. Powers and B. R. Billmeyer (Armstrong Cork Co., Lancaster, Penna.).*

The swelling of compositions from typical oil resistant rubbers has been measured in hydrocarbons having a wide range of solvent power. Compositions loaded with the same volume of SRF carbon black and no extractable softeners have been studied at 25, 70 and 100° C. The aniline point of the hydrocarbon measures the tendency to swell, and up to 100% swelling the logarithm of the volume increase varies inversely with the aniline point of the oil. Swelling was greatest with the composition from Neoprene GN and was progressively lower with those from Stanco Perbunan, Hycar OR-15, and Thiokol FA.

The swelling is greater as the temperature is raised, but the rate of increase is different with the various synthetic rubbers. Changes in the compositions during the test may be responsible for these differences. Consideration of these results and published data indicates that the slope of the log swelling vs. aniline point plots of compositions from a particular synthetic rubber does not change with temperature, loading, or degree of cure. There is apparently a small difference in the slope as the type of synthetic rubber is changed.

Tensile strength, elongation, and durometer readings of the swollen compositions show a decrease as swelling is greater, a slight decrease at 10%, and a very pronounced drop at 100% swelling. Thiokol compositions have little strength when immersed at 100°.

Friday Morning—April 28

9:30 A.M.—Determination of Rate of Cure, GR-I and Natural Rubber. *Leonard H. Cohan, Madeline Sohn and Martin Steinberg (Research Laboratory, Continental Carbon Co., Chicago, Ill.).*

In a previous paper (*Ind. Eng. Chem., Anal. Ed.*, Vol. 16 pp. 15-20, 1944) two of the authors pointed out that the tensile ratio (tensile strength at an undercure divided by optimum tensile) appears to be a convenient index of rate of cure for natural rubber and GR-S. This paper presents further evidence for the usefulness of the tensile ratio. Various possible indices of rate of cure were examined in GR-I; the same method of approach as in the previous article was used. Two sets of GR-I stocks were studied. The first set of stocks contained, respectively, a fine particle size precipitated whiting (Witcarb), furnace, thermal, channel, and acetylene blacks and a gum stock containing no pigment. In the second series various grades of channel black were used. In both sets tensile ratio showed a high degree of correlation with T-50 and combined sulfur. All three of these methods gave fairly accurate measures of cure rate in GR-I. Other methods suggested for determining rate of cure are also compared with tensile ratio, T-50, and combined sulfur.

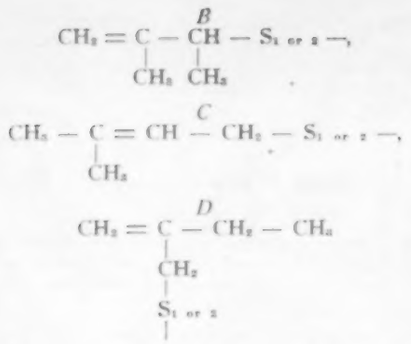
9:45 A.M.—Vulcanization of Buna S and Rubber. *La Verne E. Cheyney (Goodyear Tire & Rubber Co., Akron, Ohio).*

This paper presents a suggested working hypothesis of the vulcanization of Buna S, based on the changes occurring in physical properties with combination of sulfur. The vulcanization is believed to proceed in three stages: (1) A primary stage consists of an intermolecular combination of polymer and vulcanizing agent, resulting in a product of somewhat greater tensile strength and rigidity and markedly greater extensibility. This reaction is believed to be a chain reaction involving free radicals and attack at the alpha carbon atom. (2) A second stage consists of an intramolecular combination of the primary stage product and vulcanizing agent, resulting in a cross-linked product of greater strength and decreased extensibility. The "technical" or "optimum" cure is produced during this stage. (3) A third stage consists of the superposition of two reactions, the first a thermal depolymerization, the second a molecular rearrangement, involving the creation of additional cross linkages by the residual double bonds, resulting in a much more rigid product. This mechanism is applicable to the vulcanization of natural rubber as well. The significant differences in vulcanizates of the two polymers are believed due to thermodynamic considerations and to differences in the structure of the original polymers.

10:05 A.M.—The Chemistry of Sulfur Vulcanization. *Robert T. Armstrong, Julian R. Little and Kenneth W. Doak (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

The chemistry of the sulfur vulcanization of rubber has been interpreted in terms of the reactions of simple mono-olefin analogs with vulcanizing ingredients (sulfur, 2-mercaptobenzothiazole, zinc oxide, and zinc soap). 2-methyl-2-butene, the analog of natural rubber, forms principally a mixture of dialkenyl mono- and di-sulfides, symmetrical and unsymmetrical, containing the following structural units: β-methylcrotyl (*A*), α, β-dimethylallyl (*B*), and γ-methylcrotyl (*C*).

$$-S_{1\text{ or }2}-CH_2-\underset{\displaystyle CH_3}{\overset{\displaystyle A}{C}}=CH-CH_3,$$



2-methyl-1-butene forms a similar mixture of mono- and disulfides, containing β-methylcrotyl (*A*) and β-ethylallyl (*D*) structural units. Di-(β-methylcrotyl) monosulfide is the major product from the reactions of both 2-methyl-2-butene and 2-methyl-1-butene.

The formation of *B* from 2-methyl-2-butene and of *A* from 2-methyl-1-butene indicates that a free radical of the allylic type may be an intermediate in the reaction.

2-butene, the simplest analog of butadiene polymers, forms dicrotyl sulfide and non-volatile products.

By analogy it is concluded that sulfur vulcanization of rubber is due chiefly to the formation of disulfide and monosulfide cross-links, which are attached to the α-methylene groups or the α-methyl group of the rubber chain. As a consequence of rearrangement, allylic isomers are possible. Data are presented which show that the degree of cross-linking of rubber vulcanizates is closely related to the amount of zinc sulfide formed during the reaction.

10:30 A.M.—Electrical Conductivity of Carbon Black Loaded Rubber Stocks. *G. Goldfinger and W. R. Smith (Godfrey L. Cabot, Inc., Boston, Mass.).*

It is well known that the addition of carbon black may increase the electrical conductivity of rubber stock by several orders of magnitude. The effect varies radically with the type of carbon black employed. In 1940, Parkinson suggested a carbon black structure within the rubber stock to explain this effect. Since then this concept has acquired wide use. However, it has never been given more than a superficial qualitative treatment. The present paper is an attempt to describe "structure" in mathematical terms and to derive indications as to the electrical behavior of carbon black loaded rubber stocks.

Two assumptions are made: first, that attractive forces exist between carbon black particles; and, second, that rubber is adsorbed on the carbon black surface. If appropriate values are chosen for constants describing the various forces between carbon and carbon, and carbon and rubber, the most probable arrangement of carbon black in rubber is found to be one in which a well-defined fraction of the carbon is in a system of particles where each member is connected, through a carbon-carbon contact, with the rest of the system. The system extends through the entire volume of the compound.

Mathematical treatment of this structure permits calculation of the average length of single paths connecting branching points in the structure. The number of branching points and the number of discontinuous paths may also be computed. From the number and length of the remaining through going paths the electrical conductance of the entire sample can be estimated. The dependence of the electrical conductance of the compounded rubber stock on the particle size and size distribution of the carbon black used, as well as the previous history of the sample, *i.e.*, extent of milling and mechanical deformation, can also be interpreted in terms of the present concept.

11:10 A.M.—Theory of the Stiffening Effect of Pigments in Rubber. *S. D. Gehman (Goodyear Tire & Rubber Co., Akron, Ohio).*

The results of measurements on gum stocks in compression, particularly those dealing with the effect of the shape of the test piece on the stiffness, furnish an explanation of the stiffening effect of pigment loadings. It is pointed out that in a loaded stock films of rubber exist between the pigment particles. The films are attached to the particles, and their thickness is of the same order of magnitude as the particle diameter. Under these circumstances it is to be expected that the stiffness of the rubber will be enhanced and the rubber will be working under conditions analogous to those when a test piece in compression has a high shape factor, *i.e.*, high ratio of load area to free area. The idea is applied to calculate the relative effect of the volume loading of various carbon blacks on the stiffness in compression. Good agreement with experimental curves is secured. The theory explains the systematic change in shape of load-compression curves as pigment loading is increased. It accounts in a qualitative way for the divergence between the dynamic and static modulus for stocks with carbon black loadings. Essentially, the theory seeks to extend the compression results on large-scale test pieces to the microstructure in the loaded stock.

11:35 A.M.—The Processing Behavior of High Polymers as Revealed by Their Elastic-Plastic Properties. *R. L. Zapp and A. M. Gessler (Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).*

Although the processing characteristics of natural rubber may be satisfactorily predicted by existing plasticity measurements, these methods possess inherent disadvantages when applied to a variety of synthetic polymers. Most processing operations deform the polymer at rapid and constant rates of deformation which lie in the region of high elastic rather than viscous deformation. Studies and data are presented on the elastic-plastic properties of various Butyl and Perbunan polymers at constant and high elastic deformation rates over a temperature range of 25° to 100° C. These thermoelastic and thermoplastic properties are correlated with critical processing factors specific to each type of polymer. Comparisons with some standard laboratory methods of plasticity measurements are made. The results of these studies indicate that molecular weight distribution and the insoluble gel content, if any, are factors which in conjunction with average molecular weight determine the processing characteristics of a given type of polymer.

Friday Afternoon—April 28

1:30 P.M.—The Identification of Natural and Synthetic Rubbers. *H. P. Burchfield (Naugatuck Chemical, Division of U. S. Rubber Co., Naugatuck, Conn.).*

To provide a means of identifying the various rubbers and rubber-like materials encountered in the reclaim industry, the properties of the products obtained on pyrolysis were studied. Consideration was limited to compounds based on natural rubber, Buna S, Buna N, Butyl, Neoprene GN, polyvinyl chloride, polyvinyl acetate, and chloroprene-nitrile polymers.

It was found that solutions made up with sodium citrate-citric acid buffers and containing thymol blue, brom thymol blue, and brom phenol blue as indicators could be used to identify those polymers which yield predominantly acidic or alkaline decomposition products without appreciable interference from compounding ingredients. Polyvinyl chloride and the neoprenes are identified by the presence of hydrochloric acid, polyvinyl acetate by the presence of acetic acid, and Buna N by the presence of ammonia and amines. The hydrocarbon polymers without substituent groups including Buna S, natural rubber and Butyl are identified by differences in their specific gravities as shown by the behavior of a droplet of the condensate when suspended in alcohol-water solutions of varying composition.

These tests were combined into a single test which can be quickly carried out in the plant or field laboratory. A sample of the rubber is dry distilled from a test tube and a drop of the liquid produced is introduced into each of two previously prepared solutions. From the color reaction of the solution and the relative specific gravity of the droplet, the nature of the polymer can be deduced. Several specific confirmatory tests are also supplied.

1:50 P.M.—A Simplified Hot Tensile Test for GR-S. *W. B. Wiegand and H. A. Braendle (Columbian Carbon Co., Brooklyn, N. Y.).*

The tenderness of GR-S at elevated temperatures has virtually outmoded room temperature testing. Few laboratories are equipped with conventional hot tensile testers, and they are virtually unobtainable. Improvisations are, therefore, necessary. A modification of the Columbian hot iron test for heat embrittlement is possibly one of the simplest to provide and operate. Unlike the hot iron test for heat embrittlement, the new hot tensile test does not favor the undercures, but follows in general the room temperature tensile trend with cure. It tends to pick cures earlier than maximum room temperature tensile. It thus approximates hand-picked cures in carbon reenforced GR-S rather more closely than room temperature stress-strain tests.

2:05 P.M.—Aging of GR-S Type Vulcanizates in Air, Oxygen and Nitrogen. *J. Reid Shelton and Hugh Winn (Case School of Applied Science, Cleveland, Ohio).*

Comparison of the aging of GR-S in a highly purified nitrogen atmosphere with the results obtained in both the oxygen bomb and air oven shows that oxygen plays an important part in the changes which take place. Both inhibited and uninhibited GR-S-type vulcanizates have been studied.

The decrease in tensile strength observed in both bomb and oven aging of GR-S is due to the action of oxygen as shown by the fact that the tensile strength was essentially unchanged by aging in a nitrogen atmosphere. The hardening of GR-S, as measured by the increased modulus and decreased elongation obtained upon aging in an oxygen bomb at 80° C. and 300 p.s.i. oxygen pressure, however, does not appear to be caused by oxygen. Aging in a nitrogen bomb at the same temperature and pressure produced an equal modulus increase. Most of this increase occurred in the first two days of aging with little change observable after ten days of aging. A more drastic hardening of GR-S takes place at the higher temperature of the air oven.

More than half of the total modulus increase observed after aging at 100° C. in air may be attributed to the action of oxygen. After two days in a nitrogen atmosphere at 100° C., the modulus was essentially the same as was obtained at the lower temperature of the bomb, and an additional three days of aging produced little change. In air, however, the modulus increase was more than twice that obtained in nitrogen, and the value continued to rise.

2:25 P.M.—Time-Temperature Relationships in the Oven Aging of GR-S. *Staunton R. Harrison and Otis D. Cole (Firestone Tire and Rubber Co., Akron, Ohio).*

Results of laboratory stress-strain and dynamic cut growth tests show that, in all cases observed, the time-temperature relations for a definite change in properties follow a general form:

$$\log t = kT + C$$

where, t = time of aging
T = temperature of aging, and
k and C are constants.

The time-temperature relations for changes in stress-strain properties are similar to those observed for chemical reactions, that is, the rate is doubled for every 10° C. (18° F.) rise in temperature. This indicates that the changes observed during aging are probably the result of chemical changes. In the case of dynamic cut growth there is an indication that other factors, possibly fatigue during testing, may be overshadowing the chemical changes which take place during aging.

2:40 P.M.—The Effects of Elastomer Crystallization on Tests for Freeze Resistance. *D. B. Forman (E. I. du Pont de Nemours & Co., Rubber Chemicals Division, Wilmington, Del.).*

Tests designed to indicate the service life of elastomers at low temperatures can be classified as those which measure the rate of stiffening and those which measure the conditions under which an elastomer becomes brittle. These tests frequently lead to different conclusions on the freeze resistance of an elastomer. Neoprene Type FR and GR-S, which do not crystallize during long exposure to moderately low temperatures, maintain their general freeze resistance over a wider temperature range than Neoprene Type GN and rubber, which crystallize at moderately low temperatures. Data are presented showing that the stiffening of an elastomer at low temperature is dependent upon the time of exposure, a factor frequently neglected. The relation between hardness and modulus at low temperature has been studied, and it is shown that these factors are closely related. The relative effectiveness of certain plasticizers on the brittleness and stiffness of elastomers has been studied. A method is suggested that should assist in the selection of plasticizers.

3:00 P.M.—The Use of an A. C. Solenoid in Freeze Tests. *H. G. Bimmerman and W. N. Keen (E. I. du Pont de Nemours & Co., Rubber Chemicals Division, Wilmington, Del.).*

Numerous types of apparatus have been developed in the past two years to determine the relative flexibility and brittle point of synthetic materials at sub-zero temperatures. To reproduce test results the energy applied must be constant. Most of these apparatus fail in this respect since the velocity is not properly controlled. The lack of reproducibility of test results is frequently found to be due to this lack of controlled velocity. The A.C. solenoid is suggested as a means of obtaining a source of energy that is constant. For the purpose of illustrating the use of an A.C. solenoid as a source of energy it has been applied to the DuPont brittleness tester, which is operated in a CO_2 atmosphere. This assembly is described. A sketch and a description of a proposed apparatus in which an A.C. solenoid is applied to the newly adopted alternate A.S.T.M. brittleness test is also presented.

Molten Synthetic Rubber Solves Sub-Chaser Problem

ACCORDING to the Schori Process Corporation, Long Island City, N. Y., the first successful solution to the menace of destructive electrolytic action, which eats away the propeller shafts of Navy sub-chasers, minesweepers and other wooden vessels, has been found to be Thiokol flame-sprayed onto steel propeller shafts by a new process. Heretofore, bronze propellors fitted to steel shafts on wooden vessels produced an electrolytic action through the union of two dissimilar metals in salt water, with the result that the shaft is so eaten away within a few months that it cannot stand up under high-speed operations.

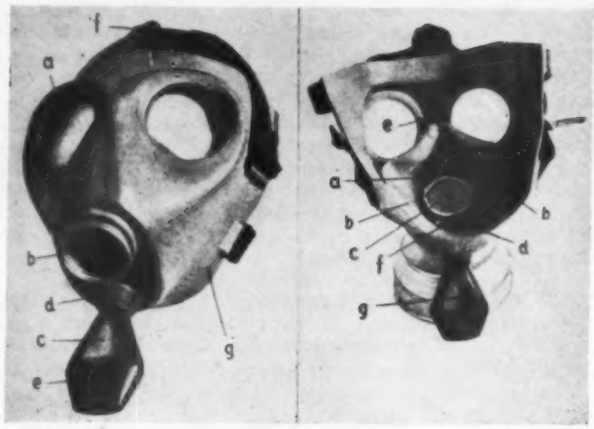
After nearly a year of experimenting with flame-sprayed plastics, which all proved too brittle and could not be easily ground for spray-gun operation, Schori engineers found that Thiokol could be sprayed on the shaft while in position on the ship. The molten rubber hardens rapidly to form the firmly-bonded coating with an extremely high abrasion resistance. Since the shaft is completely protected from contact with the sea water, there is no opportunity for corrosion or pitting to set in.

This same coating can also be used advantageously to coat the interior of bronze valves on salt-water pipelines, low temperature condensor plates and other inaccessible underwater portions of steel vessels.

Newly-Patented Gas Mask Keeps Fresh Air Circulating

A NEW gas mask so designed as to force inhaled air and exhaled air in two different directions, thereby keeping the fresh air circulating and facilitating breathing, has been patented by Solomon Z. Melup, 838 West End Avenue, New York City. The new gas mask, protected by U. S. Patent No. 2,308,991, accomplishes these actions through provision of an inner mask made of rubber and dividing the interior of the mask proper into two compartments, namely an eye compartment (between the inner mask and the mask proper) and the nose-mouth compartment (within the inner mask).

The mask proper is shaped in such a manner that it automatically adjusts itself airtightly to the face in spite of its not having an adjustable frame. This is achieved by providing the mask proper with a wide elastic edge which makes a special frame unnecessary: once the mask is put on it clings to the face, forming an air-tight protection. The inner mask is made of elastic rubber and its edges are turned inward, thus forming a tightening frame clinging to the face and dividing the mask as explained above into an eye compartment and a separate nose-mouth compartment.



Left: Exterior of Mask. (a) goggles; (b) screw base of canister; (c) rubber exhale valve; (d) screw joint; (e) exhale valve protector; (f) head harness; (g) elastic edge. Right: Interior of Mask. (a) inside mask; (b) adhesive frame tightening inside mask; (c) inhale valve; (d) exhale opening; (e) rubber tube; (f) leather band of inside mask; (g) exhale valve.

Rubber Tube Vulcanized to Inner Mask

A rubber tube is vulcanized to the inner mask, running vertically in the middle of it, starting from the screw base of the canister at the bottom of the mask and ending in the upper part of the mask between the goggles. The inhaled air passes through the canister where it becomes purified from gases and battle smokes. The thus purified air enters the mask during inhaling and is introduced into the eye compartment of the mask through the screw base of the canister.

Since the inner mask clings tightly to the face, the air can penetrate into the nose-mouth compartment within this mask exclusively through the rubber tube and the inhale valve which opens only at the time of inhaling. The fresh air coming from the canister and flowing through the eye compartment along the cheeks and eyes into the tube opening between the goggles avoids clouding and fogging of the same during use.

At the time of inhaling, the air pressure within the inner mask is reduced; thereby the inhale valve arranged in the rubber tube connecting the eye compartment with the nose-mouth compartment of the mask is opened and the exhale valve arranged at the bottom of the inner mask is closed, forcing fresh air into the inner mask and preventing exhaled air from entering this mask again. During exhaling, the increased air pressure in the inner mask airtightly closes the inhale valve in the connecting rubber tube and simultaneously opens the exhale valve, forcing the exhaled air to escape from the mask. Thus, the mask makes it possible to circulate the fresh air through the mask and to avoid exhaled air from being inhaled again and furthermore also prevents the goggles from dimming.

Since the new mask does not contain any rigid frame, it adapts itself easily to the face of the wearer. Accordingly, it is sufficient to produce the mask in two sizes: a large size, mainly for men, and a small size, mainly for women and children. The new mask is said to meet all army requirements; however, it is also well adapted for civilian use, as for instance in mines, chemical factories and other places where the air might be contaminated with noxious gases.

In U. S. Patent No. 2,330,073 the inventor also proposes a new process for producing a gas mask of the above type; however, the process protected by this patent is also usable for gas masks of other types. According to this invention, the masks are produced *on* molds instead of *in* molds as done heretofore. Such molds are made of metal or plastic, are very light, simple in construction and inexpensive to produce and operate. In the vulcanization process, boilers are used instead of presses; in these boilers, the vulcanization may be carried out by applying hot air, steam or hot water.

New Method Permits Complete Vulcanization

This new method of producing the masks also enables vulcanizing into the rubber sheets (of which the mask proper consists) connecting and other parts, as, for instance, the canister screw base, inhale and exhale valves, and the goggles. Moreover, this new process almost entirely avoids waste of vulcanized rubber as well as of raw materials and chemicals used during vulcanization.

BUY
WAR BONDS AND STAMPS
BACK THE ATTACK

Cellular Rubbers

(Concluded from the March, 1944, Issue)

By LOUIS P. GOULD

Inland Manufacturing Div., General Motors Corp., Dayton, Ohio

Present Status of Cellular Rubbers

THE information presented in this article and especially in this section of the article is largely the result of a survey of the Cellular Rubber Industries and would not have been possible except for the co-operation of a large number of persons. Their considerable assistance is acknowledged with thanks. It must be remembered that different results can be expected due to the differences in compounding technique—also that the field is new and ideas are rapidly changing. The statements made are based on general opinions and not on exact experimental data.

Soon after Pearl Harbor, very severe restrictions were placed on the manufacture of cellular rubber products involving the use of natural rubber. Practically no item could be manufactured for civilian use with the exception of metatarsal pads, and even here the percent of natural rubber permitted in the compound was limited. However, for military purposes the following articles were manufactured from natural rubber and natural rubber latex: goggles; crash helmet cushioning; precision instrument cushioning; fire and flight control sponge rubber; gaskets for submarines, airplanes and ships; and hard rubber Uni-expanded rubber for airplanes. At the same time sponge rubber articles made from reclaimed rubber were permitted for military purposes.

Now that general purpose synthetic rubber is in greater supply, the use for civilian purposes of sponge rubber made from it has been slightly increased for the following items: Orthopedic appliances, inner shoe cushions, sponge rubber for stamp gum cushions and certain mechanical goods items. For military uses there are no restrictions except for those products that are specifically prohibited in Rubber Order R-1. At this time very little natural sponge rubber is being used for military purposes and what little there is can only be secured by special authorization.

Synthetic Sponge Rubbers

Sponge rubber products are being made today from almost all of the various types of synthetic rubbers. The choice of the synthetic to be used for a particular sponge rubber application depends, as in the case of other synthetic items, on whether or not any special properties are desired in the finished product. General purpose items are usually made from either Buna S or from Neoprene GN. When sufficient quantities of Butyl Rubber are available, no doubt it will also be used for some of these applications. If a special property or a combination of special properties, such as heat resistance, low temperature compressibility or resistance to oils is desired, then one particular synthetic, or a combination of two or more synthetics, is employed to make that item.

Oil resistance of Sponge Rubbers unless covered with an added solid synthetic rubber skin is not so great as the resistance of the corresponding polymer molded solid. This is of course due to the thin skin and cell walls of the Sponge Rubber. However, although the volume change is higher than on solid rubbers, the pieces retain considerable strength and do not disintegrate in petroleum base oils as do Sponge Rubbers made from natural rubber.

Low temperature compressibility is becoming increasingly more important in war-time sponge rubber applications. This type of product finds many uses in high altitude planes of today. It should be pointed out that low temperature compressibility and low temperature flexibility are not synonymous in sponge rubber. A sponge rubber may be very flexible at sub-zero temperatures and yet be very difficult to compress. Likewise, a synthetic solid rubber compound which is flexible at —50° F., if converted into a sponge rubber compound, will probably not be compressible below —20° F. without application of tremendous loads Hard synthetic (ebonite) sponge rubber is being made from Buna S and Buna N. These hard sponge rubber products are very similar to those made from natural rubber and in some properties, notably tensile and impact strength, are even superior. These hard sponge rubber products find many uses as floats, insulation materials, etc.

Buna S is being used to make various general purpose sponge rubber items which were formerly made from natural rubber. Some of these are: Strip and sheet sponge, molded car cushions, eye goggles, eye buffers for bomb sights and aiming devices, ramp-gate gaskets for landing barges, cowl ventilator gaskets, sealing strips, and a variety of other items. Since Buna S is an oil soluble type of synthetic, it of course does not have oil resistance. It can be compounded to be more easily compressible at sub-zero temperatures than any other synthetic rubber closely resembling natural rubber in this respect. It can likewise be compounded to have good resistance to heat aging. One company reported that the difficulty of calendering thick sheets of Buna S stock had limited their production for the time being to ¼-inch thick finished sponge rubber sheets.

Buna N is ordinarily used only in sponge rubber applications where extremely low swelling in petroleum base oils is necessary. Products made from Buna N consequently find many uses in the aircraft, tank, and automotive industries, as oil seals, gaskets, etc. Unlike Buna S sponge rubber this type does not possess good low temperature compressibility.

Sponge rubber made from Neoprene GN was originally used only where medium low swelling in petroleum base oils was necessary. However, since the advent of the war, Neoprene GN (GR-M) has been used to make sponge rubber for a wide variety of general purpose uses. These sponge items closely resemble those made from natural rubber. Neoprene sponge rubber possesses one other property that finds some applications—it will not support combustion. Ordinarily, it does not have very good low temperature compressibility. The sunlight resistance of all types of neoprene sponge rubber is very important.

In normal times considerable neoprene sponge rubber would probably be used for channel rubber, gas tank gaskets and cowl ventilator gaskets. The use of neoprene in these applications might eliminate the necessity for the application of a solid added skin to the sponge rubber. The sunlight and oil resistance of neoprene sponge rubber makes it ideal for use as goggle frames, sweat bands, ear phones and other uses where such a combination of properties is required. Most manufacturers now find that the production of neoprene sponge rubber is easier to control than the production of natural rubber sponge. One reason for this is that neoprene may be readily chemically plasticized to any desired plasticity.

Neoprene FR was developed for freeze-resistant applications and is being used widely in the aircraft industry in many molded and extruded shapes. The supply has been limited by these many uses and, consequently, not much sponge rubber has been made from it. Sponge rubber items made from Neoprene FR closely resemble those made from natural rubber. The low temperature compressibility of this sponge rubber is not so good as that of Buna S but is much superior to that of Neoprene GN and Buna N. Neoprene FR sponge rubber is somewhat oil-resistant but does not approach Buna N or Neoprene GN in this respect. Many post-war uses will be found for this type of sponge rubber.

Due to the limited supply of Butyl Rubber only a small amount of work has been done to make Butyl Sponge Rubber. The sponge rubbers which have been made have had fairly good properties. No doubt uses will be found for this type of sponge rubber when Butyl Rubber becomes more available.

Cellular products having good resilience, fairly good resistance to paraffin base oils, excellent resistance to almost all acids and corrosives, excellent sunlight resistance, and excellent flame resistance, have been made from plasticized vinyl chlorides. However, these sponges are thermoplastic and their use should be limited to temperatures between 0° and 140° F.

While it is possible to vulcanize the Thiokol synthetic rubbers so as to get a porous, spongy mass, the nature of these rubbers is such that they do not make satisfactory sponges. This is tied up to a large extent with the cold flow characteristics of the Thiokols that have been produced heretofore. A new Thiokol synthetic rubber, that is capable of being vulcanized so as to greatly diminish the thermoplastic characteristics of the vulcanizate, will probably make satisfactory sponge rubber.

The comparative properties of Sponge Rubbers made from the various rubbers are shown in Table II.

Since the volume compressibility of solid rubbers is extremely low, they cannot be used successfully in compression unless space is provided for lateral expansion. The property of being highly compressible accounts for many of the uses of Sponge Rubbers. This class of the Cellular Rubber family is used for seals, insulators, filters, cushions, etc.

TABLE II.—COMPARATIVE PROPERTIES OF SPONGE RUBBERS
(Assuming proper compounding for desired properties)

Base Material	General Characteristics	Heat Resistance	Low Temperature Compressibility	Swelling in Petroleum Base Oils	Flame Resistance	Compression Set
Natural Rubber	Good	Good	Good	High	Burns	Excellent
Buna S	Good	Good	Good	High	Burns	Good
Buna N	Good	Good	Poor	Low	Burns	Good
Neoprene GN	Good	Good	Poor	Medium	Does not burn	Good
Neoprene FR	Good	Good	Good	Medium	Burns	Excellent
Butyl	Good	Fair	Fair	High	Burns	Fair
Plasticized Vinyl Chlorides	Good	Poor*	Poor	Medium	Does not burn	Fair

* This is a thermoplastic and cannot be used at temperatures above 140° F.

Synthetic Latex Foam Rubbers

In this field good results have been obtained with Neoprene GN latex. Physical properties of the cured sponge vary somewhat from lot to lot but in general it may be said of neoprene latex foam rubber that the aging properties as measured by the oxygen bomb are excellent and resistance to oil is superior to that of products made from natural rubber latex. The unfavorable properties of neoprene latex foam are the shrinkage which is approximately twice that of natural rubber latex, poor freeze resistance in the unplasticized state, and only slight improvement when freeze resistant plasticizers are added. The shrinkage mentioned is a manufacturing problem and in no way affects the finished product. It is believed that the shrinkage can be reduced by using a more concentrated neoprene latex. The permanent set is greater than in natural rubber latex sponge but it is believed that this can be improved. Cold resistant latex foam shows a greater permanent set than the unplasticized material.

Difficulties have been encountered trying to produce latex foam rubbers from either Buna S (GR-S) or Buna N latices. In addition to the troubles caused by low concentration, additional difficulties are due to the instability of some latices toward mechanical agitation, the adverse effects of some emulsifying agents on foam stability and the excessive amount of soap which adversely affects coagulation. These difficulties will no doubt be overcome in a short time or possibly they have already been overcome. Another company reports the Latex Foam Rubber has been made from Perbunan Latex. The flame resistance of all types of neoprene latex foam is especially important in the case of truck cushions, car and bus upholstery and airplane cushions where serious accidents have occurred due to the flammability of latex foam made from natural rubber.

The porosity of Latex Foam Rubbers permits the free passage of air through them, thus providing the ventilation and cooling necessary when the products are used for pads, cushions, mattresses, and similar articles.

Expanded Synthetic Rubbers

In the field of Expanded Rubbers, good products have been made from Butyl (GR-I), Neoprene GN (GR-M), Buna N, and Buna S (GR-S). In this field, it would seem that Neoprene GN and Butyl Rubber give the best soft expanded rubber due to their relative impermeability to gases. The end use determines to a great extent the synthetic which is preferred. Where resistance to aviation fuels is required, Buna N is used. For water resistance, Butyl, Buna S, and Buna N are satisfactory but Neoprene GN is poor. Hard (ebonite) type of Expanded Rubber when made from Buna N has a softening or bending point of 250° F. while a corresponding product made from natural rubber softens almost 100° lower.

Expanded soft rubbers act as admirable cushioning material since each cell encases a small amount of gas which must be deformed to absorb shock. The resistance of literally millions of these cells to deformation makes this type of material particularly good for cushioning and resistance to impact. These products are apt to lose gas pressure and become distorted if used in compression. The hard rubber expanded product is extremely light in weight yet has high tensile strength and is strong and durable. Likewise, each of the individual cells offers maximum insulation value as each cell is isolated from every other cell. Hard rubber floats are made from cell-tight expanded rubber. When these floats are pierced by a bullet only a small hole is made and a correspondingly small amount of buoyancy is lost, while a bullet hole through a hollow metal float is apt to completely destroy its buoyancy.

During the past year a specification for cellular rubbers modeled after SAE-ASTM specifications for solid rubbers has been written. This work was done at the request of the United States Army Ordnance Department. For many years Cellular Rubbers have been evaluated mainly on an apparent specific gravity basis. In the new specifications, this requirement together with those for tensile strength and elongation has been eliminated and instead load-deflection values have been substituted. Most multi-cellular rubbers are used in compression and it is believed that designers and engineers will appreciate this change. Tests for oven aging, oil resistance, cold resistance, compression set, water absorption and flexing have been included in the specification as these seem to have important relation to performance characteristics.

Conclusion

We have tried to report on the progress which has been made in the cellular rubber field during the past several years. And now—a word about the future. It is said that Russia has 17 kinds of Buna S rubber. At present we have only one kind—namely GR-S Rubber. Of course, we do have several types of Buna N and several types of neoprene rubbers. Possibly the day will come when we will have one or more types of both solid and liquid rubbers made specifically for the manufacture of cellular rubber products. In the past, many production difficulties in this field have been due to variation in the plasticity and in the rate of cure of different lots of natural rubbers and to variation in the stability and rate of cure of different shipments of natural rubber latices. We hope and believe that these difficulties will be overcome in the synthetic rubbers of tomorrow.

Characteristics of Synthetic Rubber-Vinyl Resin Compounds

VULCANIZABLE blends of plasticized vinyl chloride resins with Buna N-type synthetic rubbers, which possess most of the best properties of each material, were recently announced by the Chemical Division of the B. F. Goodrich Co., Akron, Ohio. These blends, or compounds, are mixtures of Geon vinyl resins and Hycar oil-resistant synthetic rubber. They range from 75 parts of Hycar OR and 25 parts of the Geon resins to 50 parts of each, and are said to be easily processable by ordinary rubber techniques and to yield products serviceable over an exceptionally wide range. Compositions made from them can be extruded, molded, calendered or spread, and mirror-like finishes can be produced. The following data on these blends was furnished by Goodrich:

Properties possessed by the combination of Geon resins and Hycar synthetic rubber, which are better than when the oil-resistant rubber is used alone, include the following: Extreme resistance to the effects of sunlight and ozone; increased resistance to benzene and similar aromatic solvents, both in swelling and cracking; low temperature flexibility combined with excellent heat resistance; and improved flexing life, tear resistance, resilience and oven aging.

Products in which these combinations produce unusual advantages are jackets for insulated wire and cable; shoe soling; hose covers, where resistance to sunlight, solvents, oils, chemicals and heat is needed; extruded and molded parts for the automotive and aviation industries in which resistance to sunlight, ozone, solvents, heat and cold is vital; protective coating for fuel cells of combat airplanes and vehicles; spinning cots for the textile industry; grommets, seals; insulation and cushioning pads in service where they must resist solvents, chemicals, oils, greases, sunlight and heat; plating racks and tank linings where they resist the action of corrosives and heat; roll coverings where oxidation, oils and heat are encountered such as in continuous metal processing lines; and special fabric coating applications where specific resistant properties are required.

Non-vulcanizable blends of Geon resins with Hycar are also useful for many purposes, the oil-resistant rubber acting as a plasticizer for the resins and as such wholly or partially replacing the usual liquid plasticizers. Compositions of this type, plasticized largely by the rubber, can be used to advantage in surgical and hospital goods such as blood and plasma tubing, hospital sheeting and other products where repeated sterilizations and contact with solvents must be withstood. The rubber remains in the compound under conditions which eventually dissipate liquid plasticizers.

Another typical example of use for these blends is a tough leathery composition developed for aircraft and automotive upholstery, in which the rubber serves as a wholly adequate, non-extractable plasticizer. Thin films and coatings in which the rubber has been used to replace half the liquid plasticizers also have been made.

Editorials.....

Guayule Program

AS reported elsewhere in this issue, the House Agricultural Committee has objected to the appropriation of any additional funds for the guayule rubber program and has, in fact, approved a proposal to liquidate the entire program by mid-1945. Hearings on the Appropriations Bill, submitted by the Department of Agriculture, will be heard in the Senate in the next few weeks and then a final decision will be reached. It is to be hoped that the Senate committee will have a longer range viewpoint and that the guayule program will be continued.

According to Representative Dirksen of the House committee, the guayule program has not made the showing that it should, for one reason or another, and it should be liquidated now since it is a long-range program "which will be of meager value to the war effort and will always be a costly venture." It was these two elements—time and cost—that led the House committee to the decision to deny any further funds to the program and to recommend its early liquidation.

There is no argument with the fact that the guayule program as laid down by the Department of Agriculture and as carried out to date is an expensive program. The initial bill, creating the program, provided more than $19,000,000 in 1943, while an additional $11,000,000 was appropriated for 1944, making a total to date of some $30,000,000. The latest appropriation request calls for another $5,338,000 to be expended in 1945. To date, according to the best information, guayule shrubs from 550 acres have been processed and sold to the Rubber Reserve Co. at 27 cents a pound. The total involved was approximately $236,000. In addition, some 200 tons were processed from wild shrubs in Texas.

The guayule program originally involved a lease of approximately 60,000 acres, but at the request of the War Food Administration, and with the approval of the Office of the Rubber Director, about half of these acres was returned to food crop cultivation, on the ground that the need for food by the nation was a more pressing problem of the moment. In light of expenditures to date and actual guayule rubber secured to date the program, as Representative Dirksen has put it, has not been "too impressive."

However, even at the start of the program, it was realized that it would take two to four years before any considerable rubber could be realized, and it would be false economy to liquidate the program now when initial results are around the corner. The need for guayule, which according to published reports has a definite compatability with the synthetics, or for any crude rubber has not diminished—it has increased. Crude rubber today, at any price, is none too expensive in light of its dire need. Until larger imports of crude and wild rubber are assured—whether from Latin America, Ceylon, India or the Far East itself—the guayule rubber program should be continued. It should even be enlarged.

Future of Synthetics

IN a booklet on "The Outlook for Synthetic Rubber," published by the National Planning Association of Washington, D. C., Melvin A. Brenner, economic analyst for the War Production Board, makes the interesting comment that "ultimately the synthetic rubber industry will be able to compete effectively with natural rubber, but probably not in the immediate post-war period." As Mr. Brenner sees the coming picture, neoprene, Thiokol and the Buna N-type rubbers will hold their position as special purpose synthetics; Buna S may equal or surpass natural rubber for tire use; Butyl Rubber will compete with crude rubber on price and will surpass the natural product for inner tubes; and new varieties will be developed to combine many of the desirable properties of present-day products with fewer of their limitations. In the opinion of many rubber executives, Mr. Brenner has correctly gauged the post-war picture. What do you think?

CURRENT NEWS OF THE MONTH

RUBBER PROGRAM DIFFICULTIES STRESSED IN DIRECTOR'S FIFTH PROGRESS REPORT

IN ISSUING its Fifth Progress Report the Office of the Rubber Director made it clear that although the nation is now producing synthetic rubber at a rate greater than the rate at which crude rubber was consumed in the United States in any year prior to 1941, the nation's military and civilian demands for tires and other rubber products still continued to exceed the supply. Terming the success of the rubber program "a miracle", Rubber Director Dewey called upon all civilians and state agencies to recognize that low speed limits must be enforced and all tires recapped if essential driving is to be maintained during the critical months before new synthetic tires can be produced for civilian use.

The report pointed out that with the exception of the Butyl Rubber plant at Baytown, the second half of the butadiene plant at Port Neches, and the butadiene plants at Houston, Lake Charles and Philadelphia, the primary construction of all the more than 50 plants in the original rubber program for the manufacture of butadiene, styrene, Buna S, neoprene and Butyl Rubber has been completed. The final completion of some of the large butadiene-from-petroleum plants has been delayed because of other new war programs rated as more vital and immediate. The report indicated, however, that production at full capacity at these plants will be achieved by the second half of the current year.

Discusses Civilian Phase

Discussing the civilian phase, Rubber Director Dewey stated that passenger tires cannot be produced in the quantities desired during the immediate future, for tire factories must for the present use their supply of Buna-S and tire cord on production of tires for military vehicles, airplanes, and essential trucks and buses. Until July, only slightly more than 1,000,000 passenger car tires will be built each month and some of these will be held as a reserve to protect against unexpected new emergency demands which might later interfere with production.

He referred to the fact that in the last Progress Report (issued Nov. 10, 1943) it was felt that the result of normal attrition would call for the building in 1944 of 30 million new passenger car tires. Based on present conditions it is now believed that, with the public's cooperation, 22 million passenger tires will be sufficient for essential driving. The present production plan contemplates making 22 million, 15 million of which will be produced during the last half of the year. This total will be plus or minus 10 per cent depending upon the trend of military requirements throughout the balance of the year.

Concerning the outlook for truck and bus tires, the report emphasizes the fact that the production of large size tires is limited by rubber manufacturing facilities. This is due to the enormous increase in the demand for these sizes occasioned by the war. Military trucks, bombers, amphibious landing craft, additional trucking incident to supplying outlying munitions factories, etc., all have given rise to this increased demand. New tread designs and new technologies have required new molds and other facilities. But, irrespective of the limitations which arise from these sources, some desirable conversions are now and will until next fall be impossible, because of a shortage of sufficient rayon tire cord. This shortage will require continued production of certain over-the-road truck and bus tires and large sizes of military tires with cotton cord and crude rubber. Consequently, in planning production for the next six months the whole picture is closely tied to and absolutely dependent upon completions on time of new programs for both rubber manufacturing facilities and rayon tire cord.

Based upon the above situations and assuming that the various programs will be completed on time, an analysis of supply and requirements indicates that all stated requirements of the various claimant agencies cannot be met.

Other highlights in the Fifth Progress Report included the following:

Tire facilities: The new rubber industry facilities program is fully scheduled and under way. The projects call for the expenditure by the industry of over $75,000,000 and include the installation of 107 new Banbury mixers together with accompanying milling, calendering, vulcanizing and molding facilities. These facilities will permit of the fabrication of over 50% more milled stock than could have been processed in 1943.

Tire cords: The program for the manufacture of rayon tire cord involves over 50 projects and the expenditure of approximately $75,000,000. The anticipated year-end inventory of 16,500,000 pounds of rayon cord in the United States and Canada will, however, constitute only a 35 days' supply. New conversions will rapidly reduce this provision. The year-end inventory of cotton cord, unless some way is found of using 10,000,000 pounds of nylon, will be only 20,500,000 pounds, as against a monthly rate of consumption of 24,000,000 pounds. It will be necessary to provide additional cotton cord during the second half of this year.

Carbon black, etc.: The program for the making of furnace carbon blacks, undertaken by the Chemicals Bureau of WPB, has involved the building of over 17 projects and adequate supplies of this necessary black are assured. Despite the new facilities for furnace blacks, however, the demand for channel blacks will, by the end of the year, approach twice the pre-war consumption, and the demand for "easy processing carbon blacks" will make up 80% of the total demand for channel blacks. There is no reason to believe that requirements of essential rubber chemicals and compounding ingredients will not be provided.

According to the report, the future adequacy of the rubber program depends on four specific factors, as follows:

1. Completion on schedule of all construction and expansion programs for synthetic rubbers, allied programs for rayon and cotton tire cords, carbon black, alcohol, etc., and those for new rubber industry manufacturing facilities.
2. Availability of an adequate supply of highly productive labor and well-trained technical staffs—chemists, chemical engineers, physicists, etc.
3. Freedom from work stoppages and transportation delays at plants making rubber products, synthetic rubbers, rayon and cotton tire cords, carbon blacks, rubber chemicals, alcohol, butylenes, etc.
4. Maintenance of crude imports at or above projected levels.

Manpower Problem Emphasized

It will be noted above that the second factor on which the successful completion of the rubber program depends is that of manpower. So important is this angle in view of the new draft policies adopted by Selective Service that the Rubber Director issued a Supplement to Progress Report No. 5. This Supplement, entitled "Impact of New Draft Policies Upon the Rubber Program," was issued under date of April 3.

In the Supplement the Rubber Director stated that an up-to-the-minute exhaus-

tive survey of the manpower used by the rubber program has been substantially completed and procedures instituted so that certain essential men having special qualifications will be kept where they are of maximum value to the war effort. The point was made that unless some of these key men are deferred from service many of the conclusions made in the Progress Report were quite meaningless.

According to estimates made by the ORD, the proposed cancellation of industrial deferments of men less than 26 years of age will take approximately 3.0% of the personnel from the rubber goods and reclaimed rubber manufacturing industry and about 5.0% from the synthetic rubber manufacturing plants, leaving in these groups and plants making essential rubber processing machinery about 1700 essential men less than 26 years of age, over two-thirds of whom are qualified chemists and engineers.

From latest information, it appears that about 28% of the 3500-odd employees 22 to 25 years of age in the rubber manufacturing industry may secure deferments and it is believed that this number will be sufficient to insure meeting essential military needs for rubber. At the same time, it will make available to the armed forces over 6,000 men under 26. Rubber manufacturers have been instructed to send a special form to the ORD where deferments for men under 26 years of age are desired. The procedure to be followed in filling in and sending these forms is reported elsewhere in this issue.

ADDITIONAL CHANGES ARE MADE IN APPENDIX 3 TO THE RUBBER ORDER

Several changes in the rubber regulation were made by WPB on April 5. These changes, which affect milking machine inflations, vibration dampers and shock absorbers, were contained in a revision to Appendix 3 of Rubber Order R-1, officially designated as Appendix 3, as Amended April 5, 1944.

Manufacturers of milking machine inflations will be permitted to consume natural rubber during the month of April, 1944, due to the fact that manufacturers are in the process of converting to synthetic rubber and full conversion will not be completed until the latter part of April. Previously, the rubber regulations provided that manufacturers of milking machine inflations could not use natural rubber after March of this year. The new regulation has the effect of extending the deadline for one month, provided the amounts of natural rubber consumed during April do not exceed one-third of the manufacturer's consumption of natural rubber for milking-machine inflations during the first calender quarter of 1944. The order provides that after April 30, however, no further natural rubber may be used for such equipment, except by special authorization from WPB.

Effective immediately, no natural rubber may be used in the manufacture of compression type mountings or insulations. Also, no natural rubber may be consumed in the manufacture of plate, sandwich, tubular or other types of shear mountings or insulations. This restriction covers mountings or insulations which are used under temperature conditions of —40° F. and above. Crude rubber will still be permitted, however, for aircraft engine and instrument mounts, which are used at temperatures below —40° F. In other words, natural rubber will only be permitted in equipment of this type where the low temperature ranges render synthetic rubber unsatisfactory for the purpose.

In a similar way, natural rubber may not hereafter be consumed in the manufacture of non-bonded torsional vibration dampers — that is, vibration dampers which are not fastened to metal. However, in the case of vibration dampers which are fastened to metal — known as bonded torsional vibration dampers — crude rubber will be permitted until further notice. Synthetic rubber is not satisfactory for use in the bonded type, at the present stage of development.

Natural rubber may not be consumed hereafter in the manufacture of cushioning for cameras, radio and radar instruments, or fire and flight control mechanisms, except on special authorization by the War Production Board. Such cushioning is made of soft or sponge rubber and is subjected to a type of wear and tear for which synthetic rubber is considered adequate, even at the low temperatures encountered at high altitudes. In this respect, cushioning differs from the shear mountings and insulations mentioned above—used for aircraft engine and instrument mounts under temperatures of —40° F. or below—for which only natural rubber is adequate.

Crude rubber will be permitted for bonding cements and tie-gum compounds which shall not exceed 1/32" thickness for any type of vibration mount or shock absorber.

Cut Crude Content in Tires

Continuing the effort to conserve the scanty stockpile of crude rubber, a reduction of approximately 35% in the crude content of standard sizes of civilian highway truck tires was ordered by WPB on April 1. The order was in the form of a directive issued in letter form by the ORD to tire manufacturers, but it will be formally incorporated into Rubber Order R-1 shortly.

According to an announcement issued by WPB in connection with the new order, reduction in the quantity of crude rubber needed for the highway truck tires has been made possible by the increasing supply of high tenacity rayon tire cord. Use of rayon cord in truck and bus tires makes it possible to avoid the destructive heat build-up which normally characterizes such heavy tires when they contain large proportions of synthetic rubber.

Two of the major types of truck tires affected by the new directive are the 8.25-20, 10-ply standard highway tires and the 11-22, 12-ply standard highway tires. Similar conversions are being made in the manufacture of sizes intermediate between the two mentioned.

Under the terms of the directive, size 8.25-20 may not contain more than 24 pounds of crude rubber, while size 11-22 may not contain more than 41.85 pounds of crude rubber. The directive permits the truck tires to be made in two ways, either with 100 per cent synthetic tread applied to a 100 per cent crude carcass, or with the permitted amount of crude distributed anywhere in the tire at the discretion of the manufacturer.

Further Revisions Made

Earlier, on March 23, a few additional revisions to the rubber regulation were made. In a revision to Appendix 3 to Rubber Order R-1 (later revised again as indicated above) WPB designated Butyl Rubber as a special purpose synthetic and granted special authorization to the Rubber Reserve Co. to dispose of approximately 400 tons of balata. At the same time, Amendment No. 2 to Rubber Order R-1, as Amended January 12, 1944, was issued, in which the manufacturing regulations for rubber footwear were revised.

The balata held by Rubber Reserve was showing signs of deterioration, which led to the special authorization to dispose of it. Because this particular batch is not suitable for essential civilian or military products, purchasers will be allowed to use it without regard to the usual end-use restrictions. Approximate amounts of the types available are as follows: Surinam Sheet, 19 tons; Venezuelan Block, 89 tons; Manaos Block, 152 tons; Colombian Block, 53 tons; Peruvian Prime, 1 ton; Chicken Wire, 14 tons; Crude Coquirana, 101 tons.

According to Douglas D. Haldane, Distributing Agent, Rubber Reserve Co., 15 William St., New York 5, N. Y., the selling prices of these balatas are those contained in Rubber Reserve's Circular No. 12, dated November 9, 1942. The material will be sold reweights ex warehouse where located, but the major portion will be New York delivery. Consumers interested in these balatas should communicate with Mr. Haldane, advising the quantity and grade of balata processed during the calendar year of 1939.

The designation of Butyl Rubber as a special purpose synthetic was largely in the nature of an administrative change, in view of the fact that its use has already been placed under rigid control through assignment of individual allocations to manufacturers. The supply of this synthetic has been tight for some time.

The revision in the manufacturing regulations for rubber footwear has the effect of reducing the average weight of crude rubber and latex by approximately

50% per pair. The purpose of this regulation, effective April 1, is to further conserve the crude rubber stockpile.

Additional orders affecting the manufacture and distribution of various rubber products, issued in recent weeks, follow herewith:

RECLAIMED RUBBER

Record-keeping requirements for persons making sales or purchases of reclaimed or scrap rubber have been reduced by OPA. Effective April 15, buyers and sellers need no longer keep records showing the quantity of each grade and quality on hand and on order as of the close of each calendar month. This action was effected by Amendment No. 4 to R.P.S. 56 (Reclaimed Rubber) and Amendment No. 10 to R.P.S. 87 (Scrap Rubber).

In issuing the two amendments, OPA said that this requirement is no longer necessary and therefore has been eliminated in accordance with the agency's policy of holding record-keeping and reporting requirements to the minimum. However, it was emphasized that records must still be kept of purchases and sales, with the name and address of the buyer and seller, and the price.

RUBBER THREAD

The unrestricted manufacture and distribution of synthetic rubber thread has been extended from April 1 to October 1, 1944. This action was taken by revising the existing regulation and issuing Conservation Order M-124, as Amended March 27, 1944 (Rubber Yarn and Elastic Thread).

At a recent meeting of rubber thread manufacturers with the WPB's Office of Civilian Requirements representatives, agreement was reached that this extension of time is necessary in order to develop commercially satisfactory synthetic rubber thread made from Buna S, which is still in the experimental stage.

WPB pointed out, however, in announcing the time extension, that the quantity of rubber thread made available for civilian use would be very limited for at least several months, as the synthetic rubber thread made from neoprene is going almost exclusively to the military.

RUBBER HEELS

Under the terms of Order No. 11 to M.P.R. 477 (Rubber Heels and Soles), issued by OPA on March 28, manufacturers and wholesalers of rubber heels sold in the home replacement trade have been authorized to sell and make deliveries of these heels subject to a later change in price ceilings by OPA.

This adjustable pricing provision was granted temporarily pending the establishment of dollar-and-cent ceilings for higher quality rubber heels sold in this trade, which supplies heels, through retailers, to consumers who desire to attach them to shoes in their own homes. This adjustable provision does not apply at the retail level.

Until the new ceiling prices are announced, manufacturers and wholesalers may not receive payment in excess of the maximum prices now in effect, which are for heels of all qualities.

WIRE AND CABLE

The maximum price for sales of wire, cable and cable accessories by wholesalers and jobbers to industrial, commercial and governmental purchasers has been limited to 120% of the manufacturer's net price to wholesalers in the same quantities, under the terms of Amendment No. 7 to R.P.S. 82 (Wire, Cable and Cable Accessories), issued on March 15. The limitation applies regardless of the number of sellers handling the product before it reaches the user.

This action was taken by OPA to stop pyramiding of distributors' mark-ups, a practice which is reported to have arisen in the industry since the war emergency. Relief may be granted, however, if the restriction works too great a hardship on any concern.

BOOTS AND SHOES

Manufacturers of rationed rubber footwear may apply for permission to sell some factory damaged stock, discontinued styles, and government order rejects without collecting ration currency, under the terms of Amendment No. 9 to Ration Order 6A (Men's Rubber Boots and Rubber Work Shoes), issued by OPA on April 11.

This release from rationing applies only to manufacturers' stocks and covers only those factory damaged stocks which are known as "culls," discontinued styles that have been in stock since April 1, 1942, and specially designed government order rubber footwear that has been rejected and is not saleable for ration currency because of its special style or unusual size.

MISCELLANEOUS ORDERS

In addition to the aforegoing orders, the following orders issued in recent weeks are of interest to the rubber manufacturing field:

Cotton Duck Fabrics: The production and delivery of all cotton duck fabrics, 15 or more inches in width, has been placed under strict control through the issuance of Conservation Order M-91, as Amended April 7, 1944. Some of these fabrics, including hose and belting duck and chafer fabric, were already under control.

Calcium Carbonate: Because of the mounting demands of the rubber program, WPB has placed ultra fine precipitated calcium carbonate under allocation. This action was taken in Allocation Order M-340, as Amended March 28, 1944.

Industrial Power Trucks: To improve the quality and performance of industrial power trucks, WPB has lifted restrictions on the use of synthetic rubber for anti-motor-vibration plates, lead for counter-weights, and steel plates for battery boxes. This action is covered in an amendment to Limitation Order L-112.

Abrasive Products: Limitations on the types of rubber-bonded abrasive products which may be manufactured have been eliminated by revocation of Conservation Order M-319-a. The abrasive industry, it was stated, has been fully converted to the use of synthetic rubber.

Coated Fabrics: Order No. 25 to M.P.R. 478 (Synthetic Rubber Coated Fabrics) was revised on March 13 so that its terms apply to Neoprene GN as well as to GR-M, the government designation for the same material.

METHOD OF DISTRIBUTING GR-S LATEX ESTABLISHED BY RUBBER RESERVE

The method of handling the distribution of GR-S Latex was outlined to rubber manufacturers by the Rubber Reserve Co. in Circular No. 25, issued on March 16. This synthetic latex is now being produced in government-owned plants operated by Firestone in Akron and U. S. Rubber in Naugatuck, Conn. At present, three types are available, designated as Types 1, 2 and 3, tentative specifications for which follow:

	Type 1	*Type 2*	*Type 3*
Solids ..	24.0% min.	24.0% min.	36.0% min.
pH	8.5 min.	8.5 min.	9.0 min.
	10.0 max.	10.0 max.	11.0 max.

Effective with the Synthetic Rubber Purchase Permits issued to cover shipments during the month of May, Rubber Reserve will sell GR-S Latex in *tank car lots only* to rubber manufacturers and to a selected group of distributors at a price of 18½c per pound (total dry latex solids), plus a uniform freight charge of ½-cent per pound, all such sales to be made, freight allowed, ex the producing plant upon terms and conditions previously set forth.

The distribution and sale of GR-S Latex by shipment of other than tank car lots (*i.e.*, in drums or other type containers) will be handled as a private operation by the selected distributors which include the following: American Anode, Inc., Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., General Latex & Chemical Corp., Heveatex Corp., Revertex Corp. of America, Naugatuck Chemical Division of U. S. Rubber Co., and the Charles T. Wilson Co.

These latex distributors, it was stated, will, in turn, distribute and sell GR-S Latex to rubber manufacturers and others at a price not to exceed 25c per pound for drum lots and 31c per pound for less than one-drum lots, f.o.b. point of distribution. These selling prices are based on the established distribution price of 18½c per pound for GR-S, plus the uniform freight charge, and plus a differential covering the cost of handling and drumming.

Sales of GR-S Latex by distributors which has been specially concentrated by that distributor may be subject to a differential not in excess of the usual premium differential for natural latex concentrated by a similar method to approximately the same total solids concentration.

Manufacturers wishing to purchase GR-S Latex should file an appropriate request with the Allocations Section of the Office of the Rubber Director, in accordance with established procedure, this request to specify the type latex desired. If the approved request covers a tank car lot it will be forwarded to Rubber Reserve and the latter will issue an appropriate Synthetic Rubber Purchase Permit to the manufacturer. If it covers shipment of less than a tank car, it will be returned to the manufacturer who will then be in a position to place the order with any of the selected distributors.

Open New Guayule Plant

Opening of the new guayule processing plant, which will be operated by Sochule S.A., an affiliate of the General Tire & Rubber Co., was marked with appropriate ceremonies on March 20. The plant is located in Cuatro Cienegas in northern Mexico. Financed jointly by General Tire and Mexican interests to the extent of $400,000, it is the third guayule processing plant to be opened in Mexico, and if present plans materialize it will be the largest in about two years. A number of General Tire executives were present at the opening, including William O'Neil, president.

The Sochule plant, with its present equipment, can process approximately 10,000 tons of guayule annually, which is equal to between 1,500 to 2,000 tons of guayule rubber. This output, plus increased output from the other two processing plants in Mexico, should result in a total of at least 12,000 tons of guayule rubber from that country this year. Approximately 8,000 tons were supplied in 1943.

In the meantime it was learned that Administration officials are planning to appeal to the Senate in an effort to block the proposed liquidation of the guayule program in the United States. Such liquidation has been approved by the House which wrote into its version of the appropriation bill of the Department of Agriculture a provision to the effect that the $33,000,000 program should be finally shut down by June 30, 1945. Hearings on this bill will start shortly.

It was also learned that although the House majority approved termination of the guayule program, a minority vigorously opposed the action, and a special subcommittee, headed by Representative Poage, of Texas, is currently making a field study of the situation.

COMPULSORY PERIODIC TIRE INSPECTIONS ARE TO BE DISCONTINUED

According to an announcement by OPA on April 4, compulsory periodic inspections of tires on passenger automobiles will be discontinued after April 20. However, it was stated, motorists must continue to have inspected any tires they wish to replace. It was also made clear that the action does not affect the truck tire inspection program, which continues as before.

In making the announcement, OPA made it clear that it was not indicative of the fact that the tire picture has become any brighter, but simply means that the inspection program has fulfilled its primary objective—to make motorists conscious of the extreme need for tire conservation and care. The decision to drop the passenger tire inspections was made after consultation with ORD and ODT.

It was also made clear that it is important that motorists retain their tire inspection records because OPA will continue the use of these records in the gasoline rationing program. It will still be possible, without the periodic inspections, to assure the replacement only of those tires not capable of giving further service and to maintain control of motorists' tires through the serial numbers. This will be possible because inspection by an OPA authorized tire inspector will continue to be required before a ration certificate to replace a tire is issued by a local War Price and Rationing Board.

Amend Equipment Order

Manufacturers of tire retreading, recapping and repair equipment have been provided by WPB with a detailed list of 12 types of equipment, arranged in order of urgency, and have been directed to use their facilities to turn out the items which are most urgently needed before they use their facilities to fill equipment orders of secondary importance. The new orders are covered by General Limitation Order L-61, as Amended March 23, 1944.

The groups of equipment, arranged in the sequence by which the manufacturers must use their production facilities to fill orders, even though a higher preference rating may be assigned to a piece of equipment rated lower in the production pattern, are: (1) Airplane, full circle tire molds and matrices; (2) Tractor-implement rear wheel full circle tire molds and matrices; (3) Earth-mover and road grader full circle molds and matrices; (4) Repair parts for retreading, recapping or repair equipment produced after December 7, 1941; (5) Tractor front wheel full circle tire molds and matrices.

Also (6) Truck-bus full circle tire molds and matrices; (7) Sectional molds and matrices, all types; (8) Repair parts for retreading, recapping or repair equipment produced prior to December 7, 1941; (9) Inner tube repair equipment; (10) Buffers and tire spreaders; (11) Passenger tire full circle molds and matrices and miscellaneous equipment not specifically covered in the first 10 groups, (12) Any discontinued or obsolete types of retreading, recapping or repair equipment which the manufacturer is unable to produce without loss of production.

The new regulation does not apply to retreading, recapping or repair equipment which has a retail value of less than $85.00. In general, recappers will be able to purchase parts for maintenance and repair of equipment under CMP Regulation No. 5.

Tire Quotas for April

Although an increase in the number of tires to be rationed to small trucks and farm tractors and implements is provided in the quotas established for April, as compared with March, the quotas for that month, announced by OPA on March 29, are substantially lower than those set for April, 1943, a more comparable month because of similar seasonal influences.

The April quotas of new and used passenger tires remain at the same low levels as prevailed during March. The 691,525 new passenger tires to be rationed to eligible motorists in April are just 500 more than in March. The 645,050 figure for used and reclaimed tires is the same as last month's. The new passenger tube quota is 691,325, an increase of 7.2 per cent in April over March, but almost 45,000 less than a year ago.

As a result of increased synthetic production the April quota of new truck tires of sizes 7.50 or smaller—used for the most part on small delivery trucks—is 207,345 tires, about 36,000 above the March figure. The larger sizes of truck tires—those of 8.25 or larger—are at practically the same level as in March, 115,213 tires. However, the total truck tire quota is about 45,500 tires less than the number made available in April, 1943.

While the April quota of farm tractor and implement tires was increased by about 10,000 from the March figure, it is still far below the demand for these tires and 45 per cent less than the total number of farm tractor and implement tires allocated twelve months ago.

The rear tractor tire quota—in which there is the greatest shortage—has been increased from 8,280 in March to 13,800 in April. The front tractor and implement tire quota was raised by 4600 to a level of 18,400. Farm tubes were also upped 4600 to 23,000 for April.

Amendment to Ration Order

Under the terms of Amendment No. 72 to Ration Order 1A (Tires and Tubes), issued by OPA on March 25 and effective March 31, more than 70,000 of the nation's tire dealers are relieved of filing quarterly reports of their stocks of tires and tubes.

The amendment also removes all restrictions on the number of tires and tubes allowed to be acquired by dealers so long as the replenishment portion (Part B) of a consumer's tire ration certificate is given up for each tire bought.

NEW YORK RUBBER GROUP HOLDS ITS SPRING MEETING

Approximately 300 members and guests attended the Spring Meeting of the New York Rubber Group, held on March 31 at the Building Trades Club in New York City. The program included short addresses by R. D. Young, president of the Rubber Trade Association of New York, Inc., and J. W. Bicknell, executive vice-president of the Rubber Development Corp. A sound movie, depicting naval battles from Pearl Harbor to the Gilbert Islands, was also presented. Entertainment before and during dinner was provided by two female accordionists.

Called upon to discuss "The Current Rubber Situation," Mr. Young, who recently resigned from the Rubber Reserve Co. to assume his new duties with the Rubber Trade Association, traced developments in the past few years, touching on the formation and growth of the Rubber Reserve Co., building of the national stockpile of crude rubber, the nation-wide scrap rubber drive, the birth and growth of the synthetic rubber program, and concluding with some remarks on postwar possibilities.

Mr. Young's remarks were largely in the nature of a review, interspersed with statistical information. He reminded his listeners that Rubber Reserve had driven the stockpile of natural rubber up from a normal two months' supply to over 600,000 tons; amassed a substantial stockpile of latex; garnered over 1,000,000 tons of scrap rubber in the nation-wide drive, and put 17 synthetic rubber plants in operation in the space of two years. He stated that the productive capacity for all types of synthetic rubber by the fourth quarter of the current year would reach 1,027,000 tons per annum.

Discussing the postwar status of crude and synthetic rubbers, Mr. Young expressed the belief that production of normal grades of crude in the Far East would shift largely to native estates while European-controlled estates would probably feature specialty grades. He intimated that, of necessity, the purchase and distribution of rubber in the United States would remain in the hands of the government for some time after the cessation of all hostilities, but that the government is anxious to return all trade to normal channels as soon as feasible. In concluding his talk, Mr. Young predicted that never again would this country be caught completely short on its rubber supplies.

The second speaker—Mr. Bicknell—reviewed the "Natural Rubber Program," tracing the steps taken to assure the United States of the maximum amount of natural rubber possible. The need for extraordinary effort in this direction, he said, is emphasized by the fact that imports of crude rubber dropped from about 1,000,000 tons in 1941, the peak year, to approximately 60,000 tons in 1943. He added that the Rubber Development Corp., charged with natural rubber procurement, hoped to import some 90,000 tons during the current year.

Mr. Bicknell discussed the highlights of the special agreements made with Brazil and other Latin American countries for the exclusive purchase of both wild and plantation rubber. He stated that although imports from Central America were small, they were remarkable in view of the fact that so little rubber cultivation had been practiced in that territory at any time. He also expressed the hope that the newly agreed premium price for rubber from Brazil and other countries would step up rubber shipments considerably.

During a short business session, the presiding chairman, Fred Conover (Naugatuck Chemical), announced the recent death of Bevis Longstreth, president of the Thiokol Corporation, long a member of the group, and asked the members and guests to stand for a moment in tribute. The secretary was also instructed to send a note of condolence to Mrs. Longstreth from the group.

The chairman then called upon Harry Outcault (St. Joseph Lead), chairman of the local committee in charge of arrangements for the meeting of the Rubber Division to be held in New York City on April 26, 27 and 28, to discuss some of the arrangements made to date.

Detroit to Hear Dr. Palmer

Dr. Henry F. Palmer, of the Firestone Tire & Rubber Co., formerly an administrative assistant of the Rubber Reserve Co., will be the principal speaker at the next meeting of the Detroit Rubber & Plastics Group, Inc., to be held at the Hotel Detroit Leland in Detroit on Friday, April 21. Dr. Palmer will discuss the "Ramifications of Synthetic Rubber Production." A war movie will also be shown. Tickets for the meeting are $2.50 each.

Coming Events

Apr. 21. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Apr. 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Commodore, New York City.

May 2. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.

May 5. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

May 19. Chicago Rubber Group, Hotel Morrison, Chicago, Ill.

June 6. Ontario Rubber Group, Royal York Hotel, Toronto, Ontario.

June 26-30. A.S.T.M., 47th Annual Meeting, Waldorf Astoria, N. Y. C.

Nov. 15-19. Third National Chemical Exposition, Coliseum, Chicago, Ill.

U. S. RUBBER CO. SPONSORS LOS ANGELES GROUP MEETING

The regular monthly supper meeting of the Los Angeles Rubber Group, held on April 4 at the Mayfair Hotel in Los Angeles, attended by approximately 140 members and guests, was sponsored by the U. S. Rubber Co. Various meetings throughout the year are sponsored by rubber companies in the Los Angeles area.

Seymour Hull, of U. S. Rubber, acting program chairman, took over the meeting and introduced J. M. Miller, local factory manager of the company, who acted as toastmaster for the evening. U. S. Rubber was represented by 45 of its personnel, some of whom are members of the group, and Mr. Miller introduced all of them. Brigadier General D. F. Stace, District Supervisor of the AAF Material Command, Western District, was then introduced. General Stace spoke briefly on his close association with the rubber companies in the Los Angeles area and commended them for the quick responses to the ever-changing specifications and demands of the Air Corps. An authentic war film, "The Battle for the Beaches," was then shown.

Following the presentation of the sound film, the toastmaster introduced Dr. Frederick P. Woellner, professor of education at U.C.L.A., the speaker of the evening. Dr. Woellner discussed "The American Way," during which he compared the American standards of living and thinking with those of the European countries. He concluded his talk by stressing three points: (1) All men are not born equal; (2) No nation comes out of a war the same as it goes in; (3) It is up to the American people whether or not we continue the American way of life or whether we submit to a European importation.

During the meeting it was announced that the annual golf tournament would be held at the Southern California Golf & Country Club on April 18, that July 22 and 23 had been tentatively selected as the dates for the annual summer outing, and that April 11 had been selected as the day group members would contribute to the Red Cross blood bank. A report on the insignia contest was made and five new members were introduced. Deke Maddy (Hycar), pinch-hitting for Vic Vodra (Vanderbilt), presented some "current events." Piano music was played during dinner.

In the distribution of prizes, a $25.00 War Bond prize, donated by the Dill Manufacturing Co., through J. H. Weiner, was won by Allan Moore (Commercial Rubber), while two attractively framed photographs of California scenery, donated by A. R. Hromatka, official group photographer, were won by F. E. Geisel (Northrup Aviation) and Bill Orth (Tagliabue). Several other prizes, donated by U. S. Rubber, went to Alvan Reibel (Kirkhill Rubber), Mr. Miller (Miller Gasket), Harry Friedman (Commercial Rubber), and Ken Courtois (U. S. Rubber).

LICENSES ARE NOW AVAILABLE UNDER LEDUC-DUFOUR PATENTS

Licenses covering the application of high frequency currents in the production, processing and manufacture of rubber, plastics, wood and other products under the various patents of H. A. Leduc and R. A. Dufour are now available in this country. Giodvad Grell, 33 University Place, New York City, will issue licenses in all fields except those covering rubber applications, which have been placed in the hands of the B. F. Goodrich Co., Akron, Ohio.

The Leduc and Dufour patents, growing out of experiments since 1920, financed by the French Government, cover various applications of high frequency currents. Among these are U. S. Patent Nos. 2,129,203, 2,163,993, 2,188,625, 2,261,847, 2,280,771, and 2,303,341. The latter patent issued December 1, 1942, is claimed to be a basic patent for coagulating any material capable of being coagulated "from spaghetti to wallboard."

Originally, Dufour and Leduc produced internal heating by applying a high frequency magnetic field to a compound containing conductive particles. An excessive amount of conductive material was required and the heating lacked uniformity. The inventors then turned to the use of heat generated by dielectric losses in a high frequency electric field. This process, subsequently covered by patents, produces uniform heating in masses. It was further found that small additions of ordinary compounding or binding ingredients, including carbon black, zinc oxide, zinc sulfide and resins, are particularly useful for enhancing the heating effect.

Applications of the Process

According to claims made for the use of high frequency currents in the rubber field, the process has numerous practical applications, in both the raw rubber and manufacturing ends of the field. These applications include: Thermal plasticizing of bales of raw rubber; reclaiming by heat; vulcanization of sponge, thick masses, roll coverings, rubber-coated metals, proofed goods, and molded articles; concentration, sterilization and vulcanization of stabilized latex; coagulation of heat-sensitized or electrically unstable latex, for making thread, tubes, hose, tires, footwear, etc.; insulated cables and wires; and the production of latex sponge.

The special advantages of the Leduc-Dufour process to the rubber industry are said to be a more uniform heating attained in a fraction of the time otherwise required and a considerable increase in tensile strength. These advantages also make the application of the Leduc-Dufour processes practicable in many other fields, both old and new.

An Index to Vol. 54 of RUBBER AGE will be found on pages 105-108 of this issue.

Home-Made Chemistry

It isn't always the chemists who solve the tough ones. The experience of one of the elderly workers of Lockheed Aircraft, Burbank, Calif., with baking cookies recently solved a plant problem. Operating a punch press that turns out cookie-shaped disks of sponge rubber, this employee had trouble with material sticking to the cutter. Mineral oil, spread on the rubber, prevented sticking, but had a deteriorating effect on the rubber, while applications of wax stalled production because the wax had to be cleaned off. So in her own kitchen the employee developed a mixture of vegetable shortening and paraffin—and it worked. Lockheed chemists have approved and improved the formula.

New Type Cellulose Derivative

Sodium carboxy-methyl-cellulose, a cellulose derivative which is soluble in water, has been announced by the Cellulose Products Department, Hercules Powder Co., Wilmington, Del. Experimental research is now being conducted to determine the suitability of the new material in the manufacture of emulsions, paints, textiles, oil and other industries. It is supplied as a white, granular powder, tasteless, and readily soluble or dispersible in water. Very viscous, stable aqueous solutions can be obtained with it. One use for the new cellulose derivative is said to be in the creaming of latex.

Acorn Employees Plead Guilty

Alex Colmer, former foreman of the testing room of the Acorn Insulated Wire Co., Brooklyn, and his son, James M. Colmer, former plant superintendent, pleaded guilty in Federal Court in Brooklyn on April 5 to the indictment charging them with conspiracy to defraud the government in the manufacture of insulated field wire for the Army Signal Corps. They may receive prison sentences of two years and fines of $10,000 each under the law. The company, however, has pleaded nolo contendere.

Course for Cambridge Employees

A special course in rubber technology, under the E.S.M.W.T. Program, will be given for employees of the Cambridge Rubber Co. by Morris Omansky, well-known rubber consultant of Cambridge, Mass., at Northeastern University, Boston. The course was scheduled to start on April 12 and will run to 10 weekly sessions, to be held on Wednesdays, from 6 to 10 P.M. Mr. Omansky makes his headquarters at 238 Main St., in Cambridge.

NEW RUBBER USES PREDICTED AT 10th CHEMURGIC CONFERENCE

Postwar living standards may well be revolutionized through the development of new scientific products now used on the numerous battlefronts and which may be adapted for civilian comfort once the guns have again been silenced, Dr. M. C. Teague, manager of the new products department of the U. S. Rubber Co., told the 10th Annual Chemurgic Conference in St. Louis, Mo., on March 31. The conference, which covers the fields of agriculture, industry and science, is sponsored by the National Farm Chemurgic Council.

Future homes may be heated by radiation from a film of conductive rubber on the walls, Dr. Teague stated, thus making the householder independent of fuel shortages. Furniture in the home may be covered by a two-way stretch fabric, he said, and motoring may be made more enjoyable through the use of rubber expansion joints on the highways.

Among the products listed by Dr. Teague which will probably serve the civilian in one way or another in the postwar period were the following: V-board, manufactured exclusively for aircraft construction; improved insulation; latex assault wire; spraylat, a transparent film used to cover various articles for temporary protection; latex fiber products; Vibeston, the substitute for the restricted mica in deadening sound; Koloc, the process for preserving hosiery; Kuron, the elastic fabric; Ustex, the cotton yarn used in the manufacture of parachute harness; Asbeston, the fabric used in fire-fighting suits; and Uskon, the conductive rubber employed in controlling temperatures in planes.

John L. Collyer, president of the B. F. Goodrich Co., was another speaker who addressed the conference. He outlined three major postwar goals which call for the united action of agriculture, labor and industry, listing these as: (1) Competition, umpired impartially; (2) Taxation, tailored for growth; and (3) Intensified research, for greater opportunities.

Mr. Collyer paid tribute to America's farmers and industrialists for the success with which they are attaining their wartime goals. "A new force has come into being in America," he said, "born of staggering war needs. Millions have learned how to achieve the impossible by keeping their eyes on the targets. This force can be harnessed to attain our postwar objectives, but we must agree on the targets."

A reprint of the article on "Compounding GR-S with Channel Black and Mineral Rubber," which originally appeared in the January, 1944, issue of *Industrial & Engineering Chemistry*, has been made available by the Witco Chemical Co., 6200 West 51st St., Chicago, Ill.

Rupert Joins Caldwell Co.

F. E. Rupert, until recently associated with the Rubber Reserve Co. in connection with the installation and operation of government-owned synthetic rubber plants, has joined the Caldwell Co., manufacturers' representatives and sales agents of Akron, Ohio. Mr. Rupert has had a long and varied career in the rubber field.

After being graduated from the University of Michigan in 1912, Mr. Rupert did graduate work at the University of Wisconsin, Columbia University, and Harvard University. For a period of 10 years he taught chemistry and mathematics at various institutions, including Mansfield State Teachers College, Simmons College, and Carnegie Tech. He gave up teaching in 1922 to do research work for the Chemical Warfare Service at Edgewood Arsenal.

Mr. Rupert entered the rubber industry in 1924 when he joined the former Fisk Rubber Co. at Chicopee Falls, Mass. In 1927 he went to the National Bureau of Standards as research associate for the Physical Testing Committee of the Rubber Division, A.C.S., and in 1930 joined the Anaconda Wire & Cable Co. as chief chemist of its Pawtucket, R. I., plant. Eight years later, in 1938, he left Anaconda to join the Rubber Service Division of Monsanto Chemical Co. Since August of last year he was with the Rubber Reserve Co.

Mr. Rupert has been a member of the American Chemical Society for the past 25 years and a long-time member of the American Society for Testing Materials. He was one of the founders of the Rhode Island Rubber Club, and served as president of that club. He is also a member of the Fairlawn Country Club of Akron. He is married and has one son, Everett, a captain in the Chemical Warfare Service.

The construction of two additions to its Dayton, Ohio, plant has been started by the Dayton Rubber Manufacturing Co. Total cost of the additions, one of which will expand tube manufacture, has been estimated at $110,000.

SAE Hears De-Icer Discussion

Synthetic rubber compounds are helping in the development of pneumatic de-icers to meet extremely low temperatures and new compounds are promised in the near future that will be flexible at temperatures lower than —50° F., J. E. Gulick, general superintendent of the De-Icer and Fuel Cell Divisions of the B. F. Goodrich Co., told the National Aeronautic Meeting of the Society of Automotive Engineers, held in New York City on April 5-7. Ice may form on airplanes as slowly as 1 to 3 inches an hour or as rapidly as 1 to 4 inches a minute, he said, and de-icers must be rugged enough to handle the heavy load, yet gentle enough to break the lighter coatings so they may be carried away in the slipstream. "Ice and the Airplane" was the title of Mr. Gulick's paper. Another paper of special interest was "Recent Trends in Airplane Ice Prevention Technique," given by Lewis A. Roberts of the National Advisory Committee for Aeronautics.

GOVERNMENT FLEET AT SAN ANTONIO TESTS SYNTHETIC TIRES AND TUBES ON HEAVY SCHEDULE

A special fleet at San Antonio, Texas, operating under the direct supervision of the Office of the Rubber Director, is testing synthetic pneumatic tires and tubes under severe road conditions 24 hours per day, six days per week. Tires from all American manufacturers are included in the testing program.

The fleet is made up of three sedans, fourteen trucks, and four heavy trucks. Tire sizes being tested include 6.00-16 passenger, front and rear; 7.00-20 ten-ply, truck, front and rear; 9.00-20 ten-ply, truck, front and rear; and 11.00-20 twelve-ply, rear. This range of sizes is representative of a large percentage of the total tire production. The trucks used have standard chasses but specially-designed bodies, permitting proper location and weight of load for each size and type of tire. Load centers may be raised or lowered to simulate different types of trucking operations.

San Antonio Test Fleet.

Specified load and load distribution is accomplished by means of bins (as seen in photo below, at left), gravel being used to fill the bins as required. High loads cause swaying of tires and severe sidewall and bead action which is not obtainable with a low load. All loads are carefully determined by precision standards.

A. H. Nellen has general supervision of planning and running all tire and tube tests and interpreting test results; C. R. Smith is manager of tire testing; and L. A. Werne is manager of the San Antonio fleet. These three executives are seen standing in front of the first row of trucks in the photograph on the left.

Weight boxes are empty in this view.

View of one of special tire test trucks.

DELINE AND HOLMES HEAD THE ONTARIO RUBBER GROUP

H. G. Deline, of the Dunlop Tire & Rubber Goods Co., Ltd., and J. W. Holmes, of the Polymer Corporation, were elected chairman and secretary-treasurer, respectively, of the Ontario Rubber Section of the Canadian Chemical Association, at a meeting of that group held at the University of Toronto in Toronto, Ontario, on March 29. R. A. Hayworth (Canadian Goodyear), R. M. Ferguson (Naugatuck Chemicals), and George Rishor (Canadian General Electric) were elected to the executive committee.

Dr. Norman S. Grace, manager of technical service for the Polymer Corp., and chief chemist of the Dunlop Tire & Rubber Goods Co., Ltd., was the principal speaker at the meeting, attended by approximately 70 members and guests. Dr. Grace discussed "The Manufacture of Synthetic Rubber in Canada," similar in scope to the talk he gave before the Rubber & Plastics Division of the Society of Chemical Industry at Montreal on March 10, reported elsewhere in this issue. This talk included a discussion of the synthetic rubber plant at Sarnia, the manufacture of Thiokol at Elmira, and the showing of the new sound movie, "B for Rubber."

It was announced that arrangements are being made for the group to hold a technical rubber session during the Canadian Chemical Conference which will be held in Toronto from June 5 to 7. The session will be held in the Royal York Hotel on the morning of June 6 and an interesting program will be presented. Further details of this special session will be made available shortly.

R. I. Holds Plasticizer Forum

An open forum discussion on plasticizers featured the meeting of the Rhode Island Rubber Club held in the Crown Hotel, Providence, R. I., on March 24, attended by approximately 90 members and guests. Participating in the forum were A. J. Simoncic (Shell Oil), who discussed Dutrex 6; Dr. Fritz Rostler (Wilmington Chemical), who talked on Naftolen; Ralph B. Symons (E. F. Drew), who outlined the advantages of Plasticizer SC; A. J. Puschin (Thiokol), who talked about Galex; and F. E. Rupert (Caldwell Co.), who indicated that several new plasticizers were in the making, the specific advantages of which could not yet be revealed. Many questions were asked and answered.

Boston to Hear Dewey

Col. Bradley Dewey, Rubber Director of the United States, was scheduled to address the Boston Rubber Group on April 14. Col. Dewey was to discuss synthetic rubber in general, including its possible postwar status. A full report of the meeting will appear in the next issue.

Enter Scrap Rubber Business

The Meyer and Brown Corporation, 347 Madison Ave., New York 17, N. Y., one of the largest dealers and importers in the crude rubber field prior to the advent of the Rubber Reserve Co., has expanded its present business of servicing Rubber Reserve permits for crude and synthetic rubber by entering the scrap field. The company will deal in scrap rubber and plastic scrap. Philip N. Felleman has joined the company as vice-president and will handle the scrap end of the business.

The firm of Meyer and Brown was founded in 1894 under the name of A. T. Morse, in New York, dealers in crude rubber. In 1912, Otto Meyer and Andrew Brown, junior partners at the time, purchased the business and it has been in continuous operation since under the name of the Meyer and Brown Corporation. Herbert E. Meyer is president, William L. White, vice-president, and Peter Meyer, secretary-treasurer.

The new vice-president, Mr. Felleman, has been associated with H. Muehlstein & Co., and various subsidiaries, for more than 18 years. He has been resident manager of the Boston and Akron offices, assistant crude rubber trader and manager of the plastics division. At one time he served as secretary of the Leo Meyer Co. and another as president of Alligator Rubber Products, both Muehlstein subsidiaries. He brings all this experience to his new position.

Martin Joins American Resinous

Ray C. Martin, until recently associated with the War Production Board in Washington, where he served with the Chemicals Bureau of the Plastics Division, has joined the American Resinous Chemicals Corp., Peabody, Mass., as director of the coatings division. Previous to his WPB connection, Mr. Martin was a consultant to the paint, varnish and lacquer industry. He is also the author of several publications, among them "Lacquer and Synthetic Enamel Finishes."

Huber Opens New Plant

J. M. Huber, Inc., New York City, has announced that its new furnace type carbon black plant has begun regular operation, producing the high modulus type black which is being offered to the trade under the brand name of "Modulex." In common with all other furnace blacks, this material is subject to Allocation Order M-244.

Additional "E" Awards

The Army-Navy "E" award for production efficiency was recently awarded to the Cumberland, Maryland, plant of the Kelly-Springfield Tire Co. and the Naugatuck, Conn., plant of the U. S. Rubber Co. A second star, indicative of continued production efficiency, was also recently awarded to the Mishawaka, Ind., plant of U. S. Rubber.

SYNTHETIC RUBBER IN CANADA IS TOPIC OF MONTREAL TALK

The manufacture of synthetic rubber in Canada was carefully and completely outlined by Dr. Norman S. Grace, manager of technical service for the Canadian government-owned Polymer Corp., and chief chemist of the Dunlop Tire & Rubber Goods Co., Ltd., at the regular meeting of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held at McGill University in Montreal on March 10. Dr. Grace was the principal speaker.

Dr. Grace illustrated his talk with many slides showing the early stages of construction of the Canadian plant at Sarnia and the present complicated processes from the raw material to the finished Buna S and Butyl rubber. He emphasized the point that the Sarnia plant, built at a total cost of $48,000,000, is the only synthetic plant where butadiene, styrene and isobutylene is produced as well as the finished copolymers.

In addition to the numerous slides and Dr. Grace's description of the Sarnia plant, a sound film, entitled "B for Rubber," was shown. This film traces some of the manufacturing operations at the plant. The manufacture of Thiokol at the Elmira, Ontario, plant of Naugatuck Chemicals, a division of the Dominion Rubber Co., Ltd., was also discussed, and slides showing that plant and its equipment shown.

Northern California Hears Brous

C. S. Brous, of the B. F. Goodrich Co., Akron, was the principal speaker at the regular meeting of the Northern California Rubber Group, held at the Hotel Claremont, Berkeley, Calif., on March 30. Approximately 70 members and guests were present. Mr. Brous discussed the recently-introduced Geon resins and showed numerous formulas which produce materials from hard rubber down to rubber-like sponge material. He also discussed the blending of these new resins with Hycar and other Buna N-type synthetics so as to secure the best qualities of each material. A second speaker, Vic Vodra, coast representative of the R. T. Vanderbilt Co., showed some slides illustrating the physical properties of various types of synthetic rubber, discussing each one briefly. Some prizes were distributed.

Cleveland Offices for Goodrich

B. F. Goodrich Co., Akron, has opened special offices in the Rose Building, Cleveland, for its chemical and sales engineering divisions. Activities of these divisions will be transferred to the new offices, which cover 18,000 square feet, in the near future. The various plastic and synthetic rubber-like materials developed by Goodrich will be demonstrated and sold at the new offices.

NAMES IN THE NEWS

PETER G. LEE, for five years assistant purchasing agent of the Phelps Dodge Corporation, has been named manager of the purchasing department of that company, succeeding J. H. HASTINGS who has resigned. This department handles the purchasing for all divisions, including Habirshaw Wire & Cable.

EVERETT PEARSON, associated with the E. H. Jacobs Manufacturing Co., Danielson, Conn., for the past two and a half years, has been appointed superintendent in charge of production at the Danielson plant.

DR. C. O. EDDY, on the faculty of Louisiana State University for the past eight years, has been named director of research for the Niagara Sprayer & Chemical Co., Middleport, N. Y. DR. A. S. MCDANIEL, director of research for the company for many years, is being retained as consultant in chemistry and in charge of patents.

ELMER H. WHITE, general manager of the footwear division of the U. S. Rubber Co., has also been appointed general manager of the company's fuel cell division. The latter division is responsible for large volume production of airplane fuel cells, portable tanks, and other vital war products.

A. F. RUCKS, associated with the C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y., for the past thirty years, has been elected president and general manager of that company, succeeding the late C. D. WATERS.

FRED H. AMON, technical director of carbon black operations for Godfrey L. Cabot, Inc., Boston, is now acting as a technical consultant in the Office of Rubber Director and is currently spending about half of his time in Washington.

ALFRED O. REDLAND, vice-president and treasurer of the Vulcanized Rubber Co., Morrisville, Penna., has been elected to membership in the Controllers Institute of America.

HARRY G. GODLEY, formerly associated with the crude rubber activities of the Firestone Tire & Rubber Co., both in Akron, Ohio, and in Liberia, has been named treasurer and acting assistant general manager of Shada, the Haitian organization.

F. E. "FRED" TRAFLET, vice-president of the Pequanoc Rubber Co., Butler, N. J., is recuperating from a broken leg suffered in a fall a few months ago. He has been getting around in recent weeks with the aid of a cane.

HAYES R. JENKINS, Secretary, and C. F. O'NEIL, Cleveland distributor, of the General Tire & Rubber Co., were recently elected directors of that company succeeding, respectively, the late THOMAS F. O'NEIL and T. SPENCER SHORE, former vice-president, recently resigned.

P. W. LITCHFIELD, chairman of the board of the Goodyear Tire & Rubber Co., has received the additional title of "chief executive officer" as the result of action taken by directors of the company last month.

JAMES Y. MURDOCK, noted industrialist, was recently elected president of the Canada Wire & Cable Co., Ltd., succeeding H. H. HORSFALL, who resigned due to ill health. The latter remains with the company, however, as chairman of the board.

HAROLD S. BIRKBY, associated with leading textile firms for a number of years, including Cannon Mills, has been appointed vice-president in charge of marketing for Comprehensive Fabrics, Inc., New York City, distributors of Koroseal products.

B. M. VAN CLEVE, manager of the New York division of the Sherwin-Williams Co., has been appointed general manager of the Pigment, Chemical and Color division of that company. He is succeeded in New York by T. H. ZAPPERT.

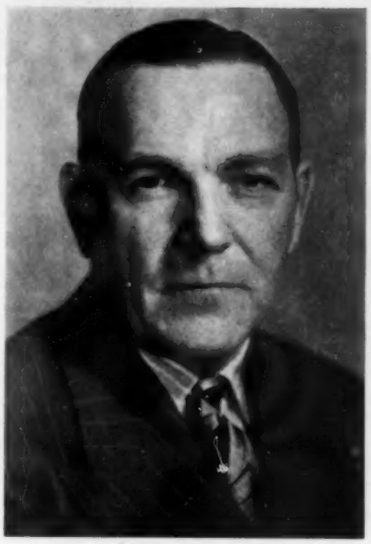
DR. O. E. MAY, associated with the Department of Agriculture for many years, and since 1942 coordinator of chemical and chemical engineering research programs in the Agricultural Research Administration, has been appointed chief of the Bureau of Agricultural and Industrial Chemistry, succeeding DR. W. W. SKINNER, who has retired from government service.

GEORGE H. REYNOLDS, general foreman of Corsair test and service operations for the Goodyear Aircraft Corp., has been appointed production superintendent of the synthetic rubber plant operated by the parent company in Akron.

LOUIS S. FRYER, production manager of the Industrial Rayon Corp. for the past four years, has been named vice-president and production manager of that company. His headquarters are at the general offices in Cleveland.

ARMAND SEQUEIRA, formerly production manager at the Williamstown, Mass., plant of the Cornish Wire Co., has joined the General Cable Corp. at its Bayonne, N. J., factory.

Changes at Seiberling Rubber



Arthur A. Leedy

A major reorganization of the production department of the Seiberling Rubber Co. has placed emphasis on increased tire production and postwar development of other products. Under the new program Arthur A. Leedy, production superintendent for the past eight years, becomes manager of tire and tube production and of the engineering division. William J. Ruscoe was named manager of a newly-created rubber and related products division, with Leo Pettitt production superintendent of that division. J. Rex Keyser will assist Mr. Leedy. Other changes include the appointment of Robert M. McPherson in charge of postwar studies for the rubber and related products division; Harry B. Cash in charge of industrial engineering, and James S. Johnson as general foreman of the milling and calendering departments.

Resigns from U. S. Rubber

Lucius D. Tompkins, who was appointed Assistant Deputy Rubber Director in October, 1942, and who has been a Deputy Rubber Director since September, 1943, has resigned as a vice-president of the U. S. Rubber Co. He has been associated with U. S. Rubber since 1916. He will, however, continue as a director and a consultant of the company.

ATHERTON LEE, one-time director of the U. S. Department of Agriculture Experiment Station in Puerto Rico, and more recently chief of the Natural Rubber Section of the Office of the Rubber Director, has joined the United Fruit Co. His new work will be to facilitate the introduction of new and needed crops in Middle America.

NEWS IN BRIEF

Plastic rifle covers have been developed by Firestone. Made from Velon, the hair-thin covers will withstand any weather and are virtually wear-proof. Guns can easily be fired while the cover is in place, according to the manufacturer.

H. K. Porter, Inc., Pittsburgh, has expanded its Process Equipment Division by purchasing the Mt. Vernon Car Manufacturing Co. and its subsidiary, the J. P. Devine Manufacturing Co., both with plants at Mt. Vernon, Ill. The purchase also puts the company into the freight car manufacturing field.

To help independent tire dealers meet the competition of company-owned stores, U. S. Rubber is planning the distribution of automotive accessories through its independent outlets, according to R. W. Collings of that company. No "variety store franchises" will be offered, it was said.

Goodrich has introduced a new "speedliner" truck tire which features new ventilating grooves on the side of the tread and reduced thickness of tread at the shoulder. In tests on two 9.00 x 20 ten-ply tires, the new-design tire is reported to have run 22 degrees cooler at the shoulder and 5 degrees cooler at the tread center, although no design changes were made at the latter spot.

Inflatable invasion boats of synthetic rubber, equipped for hostile landings and designed to glide noiselessly in shallow water, are being produced in quantity at the Woonsocket (R. I.) plant of U. S. Rubber. The boats are equipped with quick release towing bridles so they can be towed behind fast boats and released to beach themselves by their own momentum. Each carries ten men with full invasion equipment.

White boilable sheeting made of synthetic rubber has been introduced by the I. B. Kleinert Rubber Co. The sheeting consists of a base fabric of high tensile strength, heavily coated on both surfaces with a synthetic rubber coating. In tests, the sheeting was boiled 120 hours without ill effect.

Mine Safety Appliances Co., Pittsburgh, has introduced a line of colored filters to be used with its Comfo and Dustfoe respirators. There are three types of filters, each having its own distinctive color. The color shows through the transparent filter containers and permits inspection at a glance of the filter type employed.

A special line of hose assemblies that are immune to the action of aromatics in the high concentrations has been developed by the Resistoflex Corp., Belleville, N. J. The hose itself contains a core made of specially compounded compar.

An interesting article on "The Role of Industrial Research," written by Dr. Alex. Stewart, director of research of the National Lead Co., appears in the December, 1943, issue of the *Executives Service Bulletin*, issued by the Metropolitan Life Insurance Co.

The whys and wherefores of General Scheduling Order M-293, as Amended February 10, 1944, are outlined in a "Scheduling Primer" prepared by the Materials and Scheduling Office of the War Production Board. Copies are available on request to Washington.

National Calibration Service, of Brooklyn, N. Y., has been purchased by Foster D. Snell, Inc., consulting chemists and engineers, also of Brooklyn, and will be operated as a separate department by that organization.

The third in a series of five booklets on post-war subjects has been made available by the National Association of Manufacturers, 14 West 49th St., New York 20, N. Y. The latest booklet is entitled "Guide to Postwar Product Development" and treats with the part research will play in developing new products.

The 25,000th Bofors anti-aircraft gun rolled off the production line at Firestone's Akron plant on April 1. This record was achieved in the relatively short space of two years.

Auxiliary gas tanks fashioned of vulcanized fibre, originally developed to meet the demand for increased flying range for combat planes, are now also being used as "mercy bombs" to drop food and supplies to our armed forces in isolated positions. Some of these "bombs" are made at the Fisk tire plant in Chicopee Falls, Mass.

A new folder, detailing its products manufactured for the mining industry, has been made available by the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J. Products listed include conveyor belts, transmission belts, V-belt, trolley wire guards, various types of hose, friction material, and rubber-lined pipe.

Aircraft Cargo Containers

Another knotty problem of aircraft cargo transportation has been solved with the use of synthetics. Dangerous corrosive acids such as hydrofluoric and a wide variety of solvents may now be transported in collapsible emergency aircraft cargo containers as a result of further development by United States Rubber Company of synthetic products.

These containers are made in flexible disc form and measure 56 inches in diameter. They are assembled in two parts, in sheet form. One is a light cotton fabric which is treated with vinylite. The other is coated with synthetic rubber. They are held together with small eyelets spaced about three inches apart which are stapled into the material. A light-weight cord is drawn through the eyelets. The completed article is then ready to be placed around either a glass or metal container and drawn tight, much as a tobacco pouch, to insure against spillage on any part of the plane.

The need for this article was found when Army aircraft engineers found that spillage of acid resulting from accidental breakage while in transit was seeping into the frames of planes which carried this corrosive cargo and doing untold damage to the fuselage. This method of shipping has completely eliminated this hazard.

Should breakage occur or the caps of the containers become loosened owing to vibration, the acids now spill into the emergency wrapping. A flexible hose is inserted into a rubber disc which is placed into the top of the container before the draw strings are tightened. The acid fumes are carried off through this tube, thereby completely dispelling any possibility of damage from fumes or liquid.

New plastic fireproof upholstery, developed by U. S. Rubber, has been ordered by the Navy as mandatory equipment for all combat ships to provide added protection against fire, according to an announcement by the company. The covering is non-smoldering, gasoline and oil-resistant, and extremely durable under wide temperature ranges. It is also being used as turret lining and seat covering in both bomber and fighter planes.

The Eighth Edition of its "Classified Directory" has been made available by the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 42nd St., New York 17, N. Y. The qualifications, scope, functions and activities of each individual or organization member are outlined. Copies of the directory are available without cost on request to the Association.

DuPont is considering a site near Chattanooga, Tenn., as the location of a post-war nylon yarn plant. Options on certain tracts of land have already been secured and engineering surveys are now being made.

YANK INGENUITY REVEALED BY NORTH AFRICAN REPAIR SHOP

While the United States was getting along with almost no rubber but plenty of tire shops, an Air Service Command installation in North Africa was struggling with the unique problem of having enough rubber to meet its combat needs but no facilities for repairing it.

With steel landing mats resulting in many cut tires, the need for a tire repair department had become critical. So. Lt. Eugene D. Zagorsky, Plymouth, Penna., was given the assignment of organizing such a section. Working without precedent, with very little previous experience, and with no official authorization, he and 20 Air Service Command mechanics "borrowed" from other departments and went to work.

It soon became obvious that their shop was much too small to handle the volume of work. But PFC Louis C. Sorenson, Salt Lake City, Utah, saved the day when he discovered a large stable abandoned by the French. PFC Maurice S. Moberly, El Monte, Calif., and Sgt. James M. Douglas, West Springfield, Mass., helped him move the entire stock of tires and equipment into the section's new home.

All of the tires were then sorted according to size and stored in stalls which still bore, in embellished lettering, the French equivalents of "Whirlaway" and "Seabiscuit." There was plenty of room now, and Lt. Zagorsky found, as his section grew, that he was able to service other rubber equipment as well.

Thus, some men were detailed to work on self-sealing gas tanks while others specialized in probing for small leaks and stretched seams in life rafts, "Mae Wests," and de-icers.

Perhaps the most essential piece of equipment in the shop is a sturdy spot vulcanizer, operated by steam, that was developed in order to handle the outsize tires of large "ships" and trucks.

The flexibility and efficiency of this department was demonstrated when a German Focke-Wulf 190, being flown to the States for examination, came in with a torn tire. Since the tire was of odd size, no replacement was available. It was turned over to the shop where it was patched the same day.

"Looks like we've got to help keep the German planes flying too," grinned one of the Air Service Command mechanics as the tire went back on the "190."

Returns to U. S. Rubber

After a two-year leave of absence, S. P. Thacher has returned to the U. S. Rubber Co., having served as chief of the Rubber Section of the Army and Navy Munitions Board at Washington. It was announced that with his return Mr. Thacher will have charge of special brand tires sales in addition to certain tire engineering responsibilities. He will maintain headquarters at Detroit.

Amos Oakleaf with Philblack

Amos W. Oakleaf

As reported last month, Amos W. Oakleaf has joined the Philblack Division of the Phillips Petroleum Co. as technical representative. A native Kansan and graduate of Kansas University, Mr. Oakleaf has had diversified experience in the rubber industry and in rubber goods compounding. He was formerly technical representative for the Continental Carbon Co., traveling its Eastern territory, and has had many years of compounding and technical experience with both the U. S. Rubber and Toledo Industrial Rubber companies. Mr. Oakleaf is moving his residence from Toledo and will be headquartered at the Philblack Division offices in Akron.

Form Busbey & Leigh

Dr. Warren W. Leigh recently resigned from the Office of the Rubber Director to join Ralph C. Busbey in organizing the firm of Busbey & Leigh, management consultants, in Akron, Ohio. Offices of the new firm, which will offer advertising, marketing, research and business analysis services to the rubber and other industries, are located at 316 Water Street. Dr. Leigh served with WPB for more than a year, and previously served with OPA as head of the tire price section. Before entering government service, he was Professor of Business Administration of the University of Akron. Mr. Busbey has headed the Busbey Advertising Agency for the last several years.

Gum, Inc., Changes Name

Gum, Inc., manufacturers of special adhesives, of 4865 Stenton Ave., Philadelphia 44, Penna., has changed its name to Bowman Gum, Inc., adopting the name of its president, J. Warren Bowman. It was explained that the change in name was made for the purpose of convenience only and no change in the management or in the operations of the corporation is contemplated.

PROCEDURE FOR DEFERMENTS OUTLINED BY RUBBER DIRECTOR

Rubber Director Bradley Dewey, a member of the Inter-Agency Committee on Occupational Deferments, recently organized by the War Manpower Commission, has notified rubber manufacturers and companies manufacturing synthetic and reclaimed rubbers as to the procedure to follow in recommending deferments for men under 26 years of age.

In his notification, Col. Dewey stated that it is probable that Selective Service will give no consideration of deferment to men of this age group without endorsement of the Rubber Director. He pointed out that in order that any request for endorsement for deferment be valid, it is necessary to prepare at least four copies of Service Form 42-A Special. Three copies of the form must be filed with the state director of Selective Service and one copy with the ORD.

It was emphasized that the form should be prepared with the greatest of care. The statement should not be generalized and each case should be dealt with on the basis of the individual registrant. In addition to Service Form 42-A Special, it was said, there must also be submitted to the ORD a special certification.

The Rubber Director stated that "an over-all manpower shortage in a critical area is no longer a valid reason for deferment. The nature of employment, special skill, experience, training, education and the essentiality of the end-product all go to make up the present yardstick."

"Company action should be immediate," he added, "but the fact that a company has certified a man as irreplaceable does not mean that the registrant is excused from taking the pre-induction physical examination when ordered."

Introduces Witcarb R

Witcarb R, a new pigment which is said to have exceptional reinforcing properties when used in natural, reclaimed and all types of synthetic rubber, has been introduced by the Witco Chemical Co., New York. The new material is described as an extremely finely divided precipitated calcium carbonate, the reinforcing properties of which are due, in part, to the extremely small diameter of the individual particles and to the essentially spherical shape of these particles. Witcarb R is reported to be especially well adapted to the reinforcement of GR-S, imparting exceptional tensile strength and tear resistance to such compounds. It is also particularly valuable in GR-S stocks requiring high rebound, extra elongation and low modulus. Electron microscope comparisons of Witcarb R and channel black indicate that both pigments are in the same approximate range of ultimate particle size.

FINANCIAL NEWS

Intercontinental Rubber Co.

For 1943: Net income of $595,524, equal to approximately $1.00 each on 595,832 capital shares, which compares with $565,781 reported for the previous year. Sales of guayule amounted to $3,498,571 in 1943 against $2,382,409 in 1942 while gross profit from operations was $1,303,948 against $796,773. Current assets as of the year-end amounted to $2,760,291, which compares with $2,941,459 at the end of 1942, while current liabilities were $501,120 and $282,301, respectively.

Columbian Carbon Co.

For 1943: Net profit of $3,106,145, equal to $5.78 a share, which compares with $3,132,976, or $5.83 a share, the year before. Sales increased 8%, rising from $19,579,627 to $21,188,027. Failure of earnings to keep pace with the gain in sales was attributed to overtime labor costs, unusual dry hole expense, and an increase of 88c per share in the amount reserved for depreciation and depletion. Research activities for 1943 cost the company $339,925 as against $316,284 in 1942.

Raybestos-Manhattan, Inc.

For 1943: Net profit of $1,651,160, after provisions of $984,000 for Federal income taxes, $6,111,000 for excess profits taxes, and $1,000,000 for postwar and other contingencies, which is equal to $2.63 a share. This compares with $1,622,084, after $933,000 income taxes, $5,742,000 excess profits taxes, and $650,000 contingencies, or $2.58, reported for the previous calendar year. Net sales in 1943 amounted to $57,135,090, compared with $47,866,688 in 1942.

Hewitt Rubber Corporation

For 1943: Net profit of $611,883, equal to $3.64 a share including postwar refund estimated at $178,700, which compares with $442,543, or $2.65 a share including postwar credit of 52 cents a share, reported for the previous year. Net sales increased from $12,082,934 to $16,794,100. Gross and net profits in 1943 were the largest yet recorded by the company.

Belden Manufacturing Co.

For 1943: Net profit of $430,584, after provisions of $1,104,000 for taxes and $74,218 for contingencies, equal to $1.78 a share, which compares with $459,247, or $1.90 a share, reported for the previous year when tax provision amounted to $1,232,000. Net sales increased from $10,271,814 to $11,176,237.

National Rubber Machinery Co.

For 1943: Net profit of $327,923, subject to renegotiation, which is equal to $2.13 a share, and compares with $355,614, after renegotiation, or $2.31 a share, reported for the previous year. Renegotiation proceedings for 1942, it was reported, resulted in a net refund, after tax credit of $226,947, which is being met by a reduction of $51,947 in net profit for 1942 and application of a reserve of $175,000 for postwar readjustment and contingencies.

Thiokol Corporation

For 1943: Net income of $24,641, after provision of $13,631 for Federal income and excess profits taxes, which compares with $119,412, after tax provision of $262,348, reported for the year of 1942. The balance sheet as of December 31, 1943, shows total current assets of $571,054, as compared with $534,278 at the previous year-end, and total current liabilities of $88,594, against $453,273.

General Cable Corporation

For 1943: Net profit of $2,078,116, equal to $13.83 a share on the 7% cumulative preferred stock, on which unpaid dividends aggregate $52.50 a share or $7,875,000. This compares with $2,786,171, or $18.57 a preferred share, in the previous year.

Detroit Gasket & Manufacturing Co.

For 1943: Net profit of $519,096, equal to $2.21 a common share, which compares with $412,707, or $1.71 a share, reported in the previous year. No reserve for renegotiation refund was established in the 1943 report.

Garlock Packing Co.

For 1943: Net income of $999,359, equal to $4.77 a common share, which compares with $1,106,355, or $5.28 a share, reported for the previous calendar year.

Anaconda Wire & Cable Co.

For 1943: Net income of $1,319,699, which compares with $1,427,408, reported for the previous calendar year.

The large factory property formerly occupied by U. S. Rubber in Jersey City, once known as the Eureka Hose Plant, has been sold. It is currently occupied by fourteen industrial concerns.

Preparing New Wire Plant

Announcement of the occupancy of Plant No. 1 of the original Lowell Ordnance Works at Lowell, Mass., by the wire and cable department of the U. S. Rubber Co. was recently made by C. W. Higbee, manager of that department. Present plans call for the installation of machinery and other necessary equipment in approximately one-half million square feet of space as soon as the Ordnance Department completes removal of ammunition manufacturing equipment. The plant will employ approximately 1,500 persons and will confine its manufacture to long line communications cable for the United States Signal Corps. The plans also call for the training of future employees at the Bristol plant of U. S. Rubber after which they will work in the Lowell plant.

Approve Calcium Carbide Sales

Rubber Reserve Company has been authorized to dispose of its surplus supplies of calcium carbide at the same price levels provided by OPA to the Defense Supplies Corp. Rubber Reserve has a calcium carbide plant at Ashtabula, Ohio, operated for it by the National Carbide Co., which also has a similar plant at Louisville, Kentucky, the entire output of which is being used in the manufacture of neoprene in the government-owned plant in Louisville. Rubber Reserve has an arrangement by which National Carbide receives from the Ashtabula plant an amount of calcium carbide equal to that which Rubber Reserve receives from National Carbide's Louisville plant. The Ashtabula plant produces approximately 6,000 tons of calcium carbide a month and about one-third of this will be available for sale by Rubber Reserve.

Ease Camelback Restrictions

As of May 1, Grades A and C synthetic rubber camelback may be used for retreading with no restrictions, according to an announcement by Rubber Director Dewey on April 8. Both of these grades are superior to Grade F, which has been the only type available for passenger car tires during the past three months. A gradual increase in the production of GR-S has made it possible to ease former restrictions.

To clarify the camelback position, it was stated that Grade A is top quality camelback, made of GR-S only; Grade C is medium quality, and of the rubber used 25% may be reclaim; while Grade F is made solely of reclaimed rubber.

A new process for producing anhydrous hydrogen chloride which offers definite advantages over other known methods was recently announced by the Grasselli Chemicals Department of Du Pont. The new process employs chlorosulfonic acid and produces anhydrous hydrochloric acid greater than 99% purity without explosion hazard.

GERMANS METICULOUS IN THEIR HANDLING OF RUBBER PRODUCTS

Instructions as to methods of storing and handling rubber goods in Germany are extraordinarily meticulous and detailed, according to a report from a British source recently made to the Bureau of Foreign & Domestic Commerce, Washington, D. C.

The storeroom, it is specified, should be dry, dark, dust-free, well-ventilated, and never above 15° C., with humidity at about 65 per cent. Light should pass through a red or orange filter. No blue light should be used. Any heating device must be kept at least 1 meter away from the nearest rubber article and should be screened.

No lubricating materials should come in contact with any rubber surface. Belting, cable, elastic cord, and hose pipe should be stored in rolls. Small tires may be stood on their treads, but large tires should be laid flat in piles. Inner tubes should be kept slightly inflated or packed and dusted with talc.

Cleaning of rubber articles must be done with only warm water, to which 1.5 per cent soda solution may be added —after which the articles must be rinsed and polished. In the case of articles in which rubber is bonded to metals, a glycerine-spirit mixture in equal parts may be used.

New Goodrich Synthetic

B. F. Goodrich Co., Akron, has announced the development of a new synthetic rubber of the butadiene type. Tires made of the new synthetic, described as an improved general-purpose material, are reported to show reduction in tread cracking and increased resistance to road wear. Greater tackiness is also claimed for it. According to Goodrich, the new synthetic can be produced in existing government plants without the necessity of major capital expenditures or changes in present equipment, and at no added cost. Development of the new material is credited to Charles F. Fryling of the Goodrich laboratory staff. New types of butadiene synthetics were also recently announced by U. S. Rubber and Goodyear.

Plastic Sole for Footwear

A new plastic sole for men and women's footwear, which gives promise of greater lightness and additional walking comfort, has been announced by the Goodyear Tire & Rubber Co., Akron. The new sole material, derived from a vinyl chloride base, has been named "Kavtex" after William E. Kavenagh, member of Goodyear's shoe products development department, who developed it. Small portions of GR-S are compounded with the plastic to increase flex life and to permit efficiency in stitching. One of the new sole's major advantages is its complete imperviousness to moisture.

Substitute for Plasticizers

The shortage of the extremely critical materials forming the usual plasticizers for cellulose acetate, such as triacetin and the phthalic and phosphoric esters, is reported as being effectively relieved by PHO, a development of the Neville Co., Pittsburgh, Penna. PHO is a viscous, resinous liquid which can replace up to 50% of the usual expensive plasticizers for cellulose acetate. This material, when highly plasticized with PHO, with or without the usual plasticizers, is said to yield tough rubbery solids which can be calendered into sheets or used as thermoplastic adhesives. These are characterized by flexibility over a wide range of temperatures.

To Discuss Health Hazards

The health hazards presented by the new synthetic rubber industry is one of the subjects scheduled for discussion at the Second War Conference of industrial physicians, hygienists and nurses which will be held at the Hotel Jefferson in St. Louis on May 8-14. Participating in the conference will be the American Association of Industrial Physicians and Surgeons, the American Industrial Hygiene Association, the National Conference of Governmental Industrial Hygienists, and the American Association of Industrial Nurses. Full information on the conference can be secured from Dr. C. O. Sappington, 330 South Wells St., Chicago, Ill.

Synthetic Rubber Development

A synthetic rubber development that will improve the bullet-sealing qualities of gasoline fuel and oil tanks, that will facilitate tire production, and that will conserve the limited supply of natural rubber has been announced by the Firestone Tire & Rubber Co. The development embraces a special technique which produces a "modified" rubber, a small amount of which, when mixed with a large amount of synthetic rubber, gives the needed quality of cohesion or tackiness. No further disclosure of the process was made, although it was stated that it had been made available to the entire industry.

Form National Rainwear Group

Representatives of rainwear organizations throughout the country voted unanimously to form the National Rainwear Manufacturers Association at a meeting of regional trade associations of rainwear manufacturers held in New York on April 4. Fred Monesson, of the Cosmopolitan Manufacturing Co., Boston, was elected president of the new national group. F. F. Sommers, president and general manager of Rainfair, Inc., formerly called the Chicago Rubber Clothing Co., was also elected as an officer.

MARTIN, OF THIOKOL CORP., ADDRESSES CHICAGO GROUP

S. M. Martin, Jr., development manager of the Thiokol Corp., Trenton, N. J., was the principal speaker at the meeting of the Chicago Rubber Group, held at the Morrison Hotel in Chicago on March 10. Approximately 200 members and guests attended the meeting.

Mr. Martin spoke on "Thiokol ST," the new thermosetting polysulfide rubber developed by Thiokol and recently introduced to the trade. He described it as a new polymer of the polysulfide class that differs from its predecessors principally in that it is capable of being thermoset during vulcanization.

The speaker briefly discussed the vulcanized product, which has good cold flow or compression set resistance, good low temperature resistance without the use of plasticizers, and retains the low swell characteristics which feature the polysulfides as a class. He also gave data on the physical properties and characteristics of the new polysulfide, discussed compounds briefly, and stressed some of the unique properties.

The non-technical portion of the meeting was the showing of a sound movie entitled "The Battle for Russia." This was shown through the courtesy of the U. S. Army and was greatly enjoyed.

Ross Joins Herron Organization

Bryant Ross, associated with the R. T. Vanderbilt Co. for a number of years, except for a brief spell with the Office of the Rubber Director at Washington, has left Vanderbilt and has joined Herron Bros. & Meyer, of New York and Akron, general sales agents for General Atlas Carbon and other products. Mr. Ross will act as sales manager of the Eastern territory for the company, concentrating on the sale of Gastex and Pelletex. In addition, Mr. Ross will act as director of the Hamilton Laboratory, recently established at Hamilton Square, N. J. This laboratory will evaluate compounding ingredients, including plasticizers and tackifiers, developed by chemical and other organizations for use in rubber compounding.

Lode "Mineral Rubber"

Lode, a compounded asphalt product somewhat comparable to mineral rubber, developed for use with GR-S, has been introduced by the R. T. Vanderbilt Co., New York City. The new material is highly viscous at room temperature, but flows freely at 160° to 210° F. It has a specific gravity of 1.08. With suitable fillers, Lode may be used in high proportions in GR-S compounds for good processing, according to Vanderbilt. Additional sulfur is said to be usually required in compounds containing the new material. A technical bulletin on Lode is available from the Vanderbilt concern.

CANADIAN NEWS

A race to bring in synthetic rubber production in time to avoid a serious shortage resulting from a dwindling stock pile has been won, Hon. C. D. Howe, Minister of Munitions and Supply, told the Canadian House of Commons on March 23. While military and other highly essential needs will be met from synthetic output, there is little relief in sight for the ordinary civilian, he said.

The synthetic rubber plant of the Government-owned Polymer Corporation, at Sarnia, now is producing Buna S at the rate of 2,500 tons a month and Butyl rubber at 150 tons a month. Production of Buna S is expected to reach full capacity of 34,000 tons a year by May and the full rate of Butyl at 4,000 tons a year by July.

"Our problem has been to bring in production of synthetic rubber in time to avoid a shortage which would have crippled our production program," said Mr. Howe. "We have reached the point where I am able to say we have won the race. With the Polymer plant in full production we will be able to meet war and strictly essential requirements. We will not be able to give any great relief to the ordinary civilian user.

"It is expected that 900,000 tires will be manufactured from synthetic rubber in 1944. A large part of these will go on military vehicles. The balance will be distributed to the public in accordance with the regulations of the tire rationing plan."

Mr. Howe had something to say about the quality of synthetic tires: "It is not possible yet to say that a synthetic tire matches the quality of a raw rubber tire. The department is conducting very extensive tests of synthetic tires, in conjunction with the United States Army."

Regulations regarding the use of neoprene in elastic fabrics are outlined in Wartime Prices and Trade Board Administrator's Order No. A-1145, effective March 22 and signed by J. H. F. Turner, Cotton Administrator. The order stipulates that a manufacturer may use neoprene artificial thread as a substitute for natural rubber thread in the manufacture of fabrics which he produced in the base period September 15 to October 11, 1941, provided that:

(a) The weight of neoprene elastic thread a person uses in the manufacture of each yard of fabric of any kind must not be less than the weight of natural rubber elastic thread he used in the manufacture of each yard of fabric of the same or substantially the same kind, which he sold during the base period.

(b) The maximum price at which a manufacturer may sell any fabrics containing neoprene elastic thread shall be the highest price at which during the base period he sold the same or substantially the same kind of fabrics containing natural rubber elastic thread.

Administrator's Order No. A-911, respecting elastic and non-elastic garters and suspenders, is revoked, effective March 22, according to Administrator's Order No. A-1147, signed by F. B. Walls, co-ordinator of textiles and clothing.

Administrator's Order No. A-1146, signed by J. H. F. Turner, cotton administrator, revokes order No. A-33 respecting elastic, effective on and after March 22.

Stanley Knowles, C.C.F. member for Winnipeg North Centre, told the Canadian House of Commons, on March 28, that he feared the benefits of the Government synthetic rubber plant at Sarnia, Ontario, would accrue mainly to private industry in the post-war period. The present setup involves Government ownership of the company, through the Polymer Corporation. The Government had taken all the risks in building the plant. Private concerns had been called to operate the plant.

"What I want is that the benefit of this new rubber development at Sarnia will accrue to the people as a whole," he said.

Athough there were 50 rubber companies in Canada only eight received Government financial assistance for plant expansion for war production and more than 80 per cent of the amount given to the eight companies went to four of them.

The rubber and overshoe shortage is becoming acute and unless something is done about it immediately, Canadians will soon be deprived of this type of footyear, Paul Galipeau, of Montreal, newly-elected president of the footwear section of the Province of Quebec Retail Merchants' Association, announced at the recent annual meeting.

Mr. Galipeau said that footwear retailers spend much time offering excuses to their customers. He said that delivery of rubbers and overshoes was made only in oversizes and undersizes. He also said that the quality of the merchandise is so inferior that in many instances retailers refuse to sell it to their customers.

Dunlop Tire and Rubber Goods Company reports 1943 operating profit of $1,082,331, compared with $1,199,113 in 1942. After all charges net profit stood at $211,506 compared with $169,235. Provision for depreciation was down, standing at $192,156, compared with $262,681, while net taxes were reported at $694,000 compared with $650,000. That was after allowing for refundable portion of excess profits tax amounting to $140,000 in the latest year, compared with $75,400 a year ago.

After 5 per cent dividends on the preferred and 50 cents on the common, earned surplus was increased from $605,513 to $747,451. Current assets of $4,181,170 compared with $3,747,514 at the end of 1942, while current liabilities of $842,866, compared with $584,274. Working capital was $3,338,304, compared with $3,163,240.

In dealing with operations, James I. Simpson, president and general manager, states: "The total value of sales in 1943 decreased from the preceding year in spite of the upward trend which developed in the later months following the release of limited quantities of synthetic rubber.

"During the later months of 1943 synthetic rubber in limited quantities became available but its use was in the main confined to the development and testing of tires and other rubber products for direct war purposes and the production of a limited number of tires in order to relieve the pressing demand for essential transportation. All stocks for civilian purposes, both of tires and mechanical rubber goods, have now been seriously depleted and future supplies of these goods will be governed by the amount of rubber released for civilian requirements by the Rubber Controller."

Form Jar Ring Committee

The formation of a Home Canning Jar Ring Manufacturers Industry Advisory Committee, with Lewis F. Gayner, of the Containers Division, as government presiding officer, was recently announced by WPB. Committee members include: E. F. Brownworth (U. S. Rubber), Ralph E. Conder (Boston Woven Hose), A. B. Cornell (Hamilton Rubber), F. W. Frerichs (Cupples), Arthur Kendall (Crunden Martin), B. J. Lee (Jenkins Bros.), J. J. McCarthy (Crown Cork & Seal), Alvin M. Owsley (Ball Bros.), and W. F. Schacht (Schacht Rubber). An initial meeting was held on April 5.

Buys Interest in Carlisle Tire

According to reliable reports in financial circles, the Pharis Tire & Rubber Co., Newark, Ohio, has purchased a controlling interest in the Carlisle Tire & Rubber Co., Carlisle, Penna. The latter company is an old established manufacturer of inner tubes and in recent years has been producing camelback on a fairly large scale. The company employs between 75 and 100 people. No changes are said to be contemplated at present in either policy or personnel. Pharis Tire recently acquired Molded Materials, Inc., manufacturers of heavy-duty truck brake lining, located in Ridgeway, Penna.

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come. WAR BONDS to Have and to Hold.

The Treasury Department acknowledges with appreciation the publication of this message by

THE RUBBER AGE

★ Let's All Back
★ the Attack...
★ with War Bonds!

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

OBITUARIES

Charles A. Joslin

Charles A. Joslin, vice-president and general manager of the Panther Rubber Co., Ltd., Sherbrooke, Quebec, Canada, died suddenly of heart failure at his home on February 26. He was 70 years of age.

Born in Cleveland, Ohio, on March 25, 1875, Mr. Joslin was associated with several rubber companies in Trenton, N. J., and Akron around the turn of the century. From 1907 to 1912 he was associated with the North British Rubber Co. at Edinburgh, Scotland. In 1914 he went to Sherbrooke to establish the Panther Rubber plant in Canada, which expanded considerably over the years under his guidance.

Mr. Joslin was a member of the Sherbrooke Rotary Club for more than twenty years until ill health forced him to resign. One of the founders of the Sherbrooke Country Club, he was also a life member of the Sherbrooke Snowshoe Club and a member of the St. George's Club. At one time he was chairman of the Sherbrooke branch of the Canadian Manufacturers Association. He was also a member of Masonic Lodge No. 5, Trenton.

A. C. Israel

A. Cremieux Israel, president of the A. C. Israel Commodity Co., Inc., 95 Front St., New York City, dealers and importers of rubber and other commodities, including foodstuffs, died in Palm Beach, Florida, on March 23, after a long illness. He was 64 years of age. Born in Clinton, Louisiana, Mr. Israel spent most of his life in the commodity business. In addition to membership in the Commodity Exchange, he was also a member of the New York Cocoa Exchange. His social affiliations included membership in the Harmonie and Century Country Clubs. He leaves a widow and two sons.

David W. Mulford

David W. Mulford, specialist in sales development work on shellacs for William Zinsser & Co., importers and distributors of shellac, of New York City, died in a hospital in Staten Island, N. Y., on March 30, following a long illness. He was 63 years of age. Born in Elizabeth, N. J., Mr. Mulford was a member of an old and distinguished family, and was a lifelong member of the Society of Mayflower Descendants. He received his early education at the famed Pingry School in Elizabeth. About 40 years ago Mr. Mulford entered the shellac field by joining Henry W. Peabody & Co., well-known importing firm. He pioneered in the development of "scientific shellacs", products of Angelo Brothers of Calcutta, India, in the United States. When the Peabody firm was liquidated in 1932, Mr. Mulford joined the staff of William Zinnser & Co., where he continued his work on shellac. He was especially prominent in technical work for the U. S. Shellac Importers Association. In addition, he was a long-term member of both the A.C.S. and the A.S.T.M., and was a familiar figure at meetings of various local rubber groups.

Dutrex 6 Plasticizer

Dutrex 6, a new plasticizer and extender for GR-S, which also finds application in the compounding of both natural and reclaimed rubber, was recently introduced by the Shell Oil Co., Inc., 50 West 50th St., New York 20, N. Y. The new product is described as "a high molecular-weight hydrocarbon product with a controlled degree of unsaturation and sulfur-reactivity." Tests are said to have indicated that Dutrex 6 is readily incorporated with most types of rubber and to have unlimited compatability with GR-S. Owing to its unsaturated nature, it is sulfur-reactive, requiring approximately the same amount of sulfur as GR-S when used as an extender for the latter. Because it softens the stock and aids the incorporation pigments, with relatively little effect on tensile strength, highly extended and heavily loaded stocks can be produced without sacrificing quality or processability. A technical bulletin giving laboratory data on Dutrex 6 in tire tread, footwear and other GR-S compounds has been made available by Shell Oil.

Thiokol Club Makes Progress

Considerable progress is reported by the Thiokol Technical Club, organized last September by members of the Thiokol Corporation, Trenton, N. J., as a means of exchanging technical ideas and information among company chemists and technicians. Certain of the sessions have been opened to other rubber concerns, especially when outside speakers appear. Among those who have already addressed the club are Edward Cunningham, of Stanco Distributors, Inc., William B. Wiegand, of Columbian Carbon Co., O. M. Hayden, of DuPont, and George Vila, of Naugatuck Chemical. The two Standard Oil sound movies—"Bouncing Molecules" and "Rubber Goes Synthetic"—have also been shown.

Goodrich Offers New Compounds

A new series of compounds, consisting of blends of plasticized vinyl chloride resins (Geon) and Buna N-type synthetic rubbers (Hycar) are currently being offered by the Chemical Division of the B. F. Goodrich Co., Akron, Ohio. These compounds are said to possess most of the best properties of the combined materials and compositions made from them can be extruded, molded, calendered, or spread. The compounds are being offered in both vulcanizable and non-vulcanizable types, there being specific applications for either type.

Minnig Joins Witco Chemical

C. J. "Carl" Minnig, who has been vice-president of the Continental Carbon Co., has been appointed vice-president of the Witco Chemical Co., formerly known as Wishnick-Tumpeer, Inc. In his new capacity, Mr. Minnig will direct the sales of Witco and Continental carbon blacks and will make his headquarters in the Akron office at 311 Peoples Bank Building. Witco Chemical was recently appointed sole distributor of the Continental blacks manufactured by the Continental Carbon Co.

Third Chemical Exposition

Sponsored by the Chicago Section of the American Chemical Society, the Third National Chemical Exposition will be held on November 15 to 19 at the Chicago Coliseum in Chicago, Ill. The two preceding expositions were held in Loop hotels. More than 50,000 square feet of floor space will be made available at the Coliseum, all of which will be on one floor. Headquarters for the Exposition have been opened at 330 South Wells St., Chicago 6, Ill.

Form Celanese Chemical Corp.

Organization of the Celanese Chemical Corporation as a division of the Celanese Corporation of America, to handle the sale of various chemicals manufactured at the Celanese plants, was recently announced. Among the chemicals currently produced, as well as those planned for early production, are butadiene, hexamine, tricresyl phosphate, triethyl phosphate and diethyl phthalate. "Celluflex," a plasticizer for GR-S, is also under development.

Industrial solid tires of high conductivity compound, used on equipment in plants manufacturing gunpowder and other highly combustible materials, are now being made of synthetic rubber, according to an announcement by U. S. Rubber.

The use of zinc oxide for smoke screen purposes is the subject of a recent folder made available by the N. J. Zinc Co., 160 Front St., New York 7, N. Y. Copies are available on request.

when that day of Victory comes..

A Message to Post-war Product Planners

ELASTI-CALS

The Name Plate with Color and S-T-R-E-T-C-H

America will one day soon again cherish a hard won peace. And factories throughout the nation will change their song . . . from the roar of war to the hum of peace-time industry. ELASTI-CALS, the decoration and nameplate with Color and S-t-r-e-t-c-h, is a peace-time product now serving conspicuously in war. They will be available again . . . ready to help rubber manufacturers everywhere . . . by providing speedy, edgeless product identification and eye-appealing decoration... in varying degrees of flexibility . . . in any size, any colors or design with life-of-the-product durability. It's sound to plan *now* for decorating and identifying of your post-war products. Write for ELASTI-CAL samples and full details. Address inquiries to Dept. 56-4.

Buy War Bonds and Keep Them!

THE MEYERCORD CO.

CHICAGO • 44 • ILLINOIS

Capitol Process Liner Treatment

versus

Untreated Liners

If you are using untreated liners because it has been believed that processing would make them too expensive, we emphasize that Capitol Process Liner Treatment is reasonable in cost.

Further, our treatment will make it possible to use your liners for a considerably longer time, thus actually reducing purchases of new cotton piece goods. Over a period of time Capitol Liner Treatment will, literally, "pay for itself."

Take advantage of our offer to process a sample liner gratis. Send 50 or 100 yards and we will treat it and return for testing in your plant. No obligation will be incurred.

●

TEXTILE PROOFERS, INC.

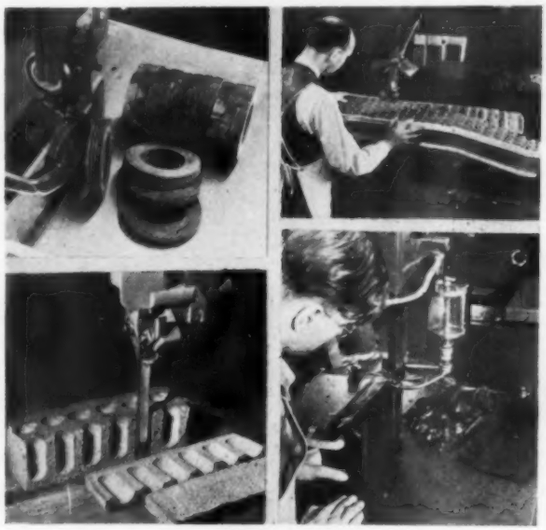
181-193 Culver Ave., Jersey City 5, N. J.

Originators of the Liner Capitol Process Treatment

NEW EQUIPMENT

High Speed DoAll Zephyr Saw

The DoAll Zephyr Contour Machine, recently developed and introduced by Continental Machines, Inc., 1301 Washington Avenue South, Minneapolis, Minn., has been found to have applications in a number of



fields, including rubber, plastics and metal. Employing saw bands from 3/32 to 1 inch in width, the new cutting tool cuts swiftly and cleanly through hard or soft rubber, sponge rubber, rubber-impregnated materials, and compositions in practically any form with exceptional ease. It is already being used for cutting tank treads, at a rate of 45 square inches per minute, and hard rubber gaskets of 4½ inch outside diameter and 3 inch inside diameter in 45 seconds. Some of these applications are indicated in the accompanying photograph.

One of the many advanced mechanical features incorporated in the Zephyr construction is an infinitely variable speed unit regulated by a hand wheel control which provides a wide range of cutting speeds from 1,250 to 5,000 feet per minute and any fixed rate from 5,000 to 10,000 feet per minute. Speeds in this range are essential for the sawing of rubber and many other materials in order to obtain a maximum rate of cutting and to assure a smooth finish. A special dial furnished with the cutter tells at a glance the proper saw speed, size, pitch, and feed required for sawing the various types of rubber and other compositions. A high speed airplane-type tachometer reveals the saw travel in feet per minute when the machine is in operation.

Fibre-Covered Midget Static Bars

A new line of metal-encased static bars with an outer casing of fibre has been developed by the Simco Co., 4929 York Road, Philadelphia, Penna. This type of bar is said to be especially efficient in eliminating positive charges of electricity which are inherent in

such materials as rayon, nylon, wool and certain kinds of transparent films.

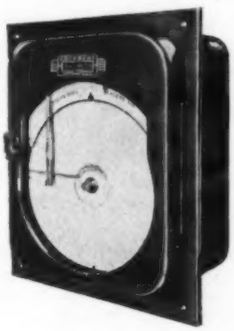
The bar consists of a charged inner bar with points spaced throughout its length and a brass casing surrounding the inner bar with holes spaced equally throughout its length so that each point of the inner bar comes in the center of the hole of the brass casing, the inner bar being held in position in the brass casing by insulating bearings. Over the brass casing is a snugly fitting fibre covering. Before drilling the brass casing, the outer fibre casing is slid in place and both are drilled at the same time.

Metal clamps metallically connected to the grounded framework of the machine to which the bar is applied are used at each end of the bar and sometimes at the middle to support the bar. The brass casing of the bar is therefore insulated from the ground by the fibre casing and is charged by induction from the inner bar and ground. The potential of the brass casing is adjustable.

These new bars are very well suited to applications where highly inflammable vapors are present for two reasons. Firstly, the charged parts of the bar are protected by the outer casing of fibre against accidental contact with anything which might produce a spark, and secondly, since the brass casing is ungrounded, the tendency for a corona discharge or actual spark discharge to take place between the points of the bar and the brass casing is reduced to a minimum.

Cochrane Boiler Meter

A new boiler meter of the steam-flow, air-flow type, known as the Cochrane Boiler Ratio Meter, has been introduced by the Cochrane Corp., Philadelphia 32, Penna. Several important advantages are claimed for this new meter over other constructions on the market. The operator can establish the relation of air supply to fuel supply (measured by steam generated) most



favorable to his particular operation by means of an easily adjustable cam in the air flow mechanism. Quick and easy reading is provided by a red indicating pointer operating across a white 10-inch scale, making it unnecessary to examine closely the position of the pens to determine whether the air is excessive or insufficient, as the movement of the pointer is 3 times as great as the differences between the pens. The steam flow mechanism is that of the standard Cochrane Friction-Free Electric Flow Meter, operating on the null balance principle, assuring highest accuracy. The air flow mechanism is based on the highly responsive Hays slack diaphragm, equipped with an electric motor follow-up for ample power.

Millions OF TINY PARTICLES OF WATER

QUENCH OIL FIRES

Fire caused by flammable liquids comes quickly, unexpectedly. Then any moment a devastating conflagration might spread through the plant . . . unless ample protection has been provided.

FIRE-FOG offers such protection. This newest of "Automatic's" Systems does three things and does them automatically and amazingly well: It *blankets* . . . it *isolates* . . . it *quenches.* Millions of tiny particles of water—forming a mist-like spray—cloak and choke the flames, "island" and cool the fire, extinguish the blaze!

Many months ago "Automatic's" engineers started working on FIRE-FOG. Thousands of dollars were spent in designing, experimenting and perfecting. Today FIRE-FOG is ready for fire guard duty, and when necessary will go into action with a speed that is seemingly miraculous. Best of all, it does quickly the job it was designed to do—*quench flammable liquid fires!*

Want more information? Ask to have an "Automatic" Engineer drop in to see you. There's no obligation.

"AUTOMATIC" FIRE-FOG

★ IT BLANKETS
★ IT ISOLATES
★ IT QUENCHES

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA ★ YOUNGSTOWN, OHIO

★ ★ ★ OFFICES IN PRINCIPAL CITIES ★ ★ ★

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA — RATE OF RISE

RUBBER
★
SYNTHETIC RUBBER
★
PLASTICS

THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of hand-miking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time — before* damage is done. And *continuously*— the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible — and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*

Ask for our bulletin on the Schuster Magnetic Gauge.

THE MAGNETIC GAUGE COMPANY
60 EAST BARTGES STREET AKRON, OHIO
Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.

REVIEWS

BOOKS

Modern Synthetic Rubbers. (2nd Edition). By Harry Barron. Published in England. Distributed by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 6 x 9 in. 355 pp. $6.50.

(*Available from Book Department,* RUBBER AGE)

Whenever there is a need for anything someone invariably comes along and supplies it. There has been such a need for a book on synthetic rubber and Dr. Barron has filled it admirably. This second edition of his book is packed full of excellent information on this pertinent and topical subject. It is written in a clear and understandable style, and the text is enhanced by the inclusion of many excellent charts, structural organic formulas, and 167 tables. Charts and tables take the place of thousands of otherwise needed additional words in the text. (EDITOR'S NOTE: Although termed the "second edition," this edition is the first available for general distribution in this country. The original edition had a limited printing, and distribution with few exceptions was confined to England.)

In the preface the author tells of his enthusiasm for synthetic rubber and bemoans the fact that so little research on it has been carried out in his own country—Great Britain. "We have certainly been traveling on the train of progress," he writes, "but with our backs to the engine—and third class!" Then he discusses the work in the United States and states frankly and very nicely, "The difficulties of handling the new materials have been tackled with commendable thoroughness. Moreover, what is perhaps more laudable, the results have been published." Later he also states, "It is a fact that nearly all the great technical developments associated with rubber have emerged from the consumers and not from the growers. Rubber owes its eminence and importance almost entirely to the efforts of the tire manufacturer (notably in the U.S.A.) whose technical developments have been amazing."

The book is up-to-date, is well printed on good quality paper, and contains about 24 photographs on special coated stock. In the text there are many quotations from the literature to substantiate the author's statements, and at the end of each chapter, there is a list of pertinent references to articles and books. There are many outlines of practical methods of preparing substances, conducting polymerizations and making rubber compounds. There are also excellent name and subject indices, which cover seventeen pages alone.

Typographical errors are few and generally obvious. There are a few inconsistencies in dates, such as: pages 293 and 295 (Semon began his work at Goodrich in 1926, not 1925); pages 163 and 222 (neoprene appeared on the market in 1932, not 1930); page 272 (Thiokol has been available commercially since 1930, rather than 1931 as stated). On page 320 it is stated that "no method exists for the direct estimation of natural rubber in a compound." Since the writing of this book a method for this purpose has been developed using the infra-red spectrograph (Barnes, Liddle & Williams, *Ind. Eng. Chem. [Anal. Ed]*, Vol. 15, No. 2, pages 83-90, February 15, 1943; reprinted in *Rub. Chem. & Tech.*, Vol. 16, No. 3, pages 634-649, July, 1943).

The contents of the book are divided into three major parts. In order to show the scope of the book, a list of these parts and their sub-topics is given: Part I—General Considerations: natural rubber and synthetic rubber-like materials; economics of synthetic elastic materials. Part II—Chemical and Physical Background of Synthetic Elastic Materials: terminology; historical background of syn-

thetic elastics; chemical behavior and structure of natural rubber; raw materials; polymerization and copolymerization. Part III—Technology of Synthetic Elastic Materials: elastomers—S.K.B., buna rubber, Perbunan, Hycar, Chemigum, neoprene, polyisobutylene, Butyl Rubber; Thiokol; ethenoid plastics (vinyl products, Koroseal, Butacite, acrylic derivatives); ethyl cellulose; and additional comparative properties of elastics.

HARRY L. FISHER

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Handbook of Chemistry (Fifth Edition). Compiled and Edited by Norbert Adolph Lange. Published by Handbook Publishers, Inc., Sandusky, Ohio. 5⅜ x 7¾ in. 2092 pp. $6.00.

The latest edition of this reference work of chemical and physical data used in both laboratory and factory has been completely revised and brought up-to-date. All of the subject matter in the previous edition has been retained, with one or two minor exceptions, in addition to which a number of new tables appear. These include a periodic table (Deming) and tables on flammable liquids, flame temperatures, plastics, fluorescence of chemicals, minerals and gems, and water for industrial use. Many of the previously included tables have been extended or completely rewritten, including those on the physical constants of organic compounds, nomenclature of organic compounds, trade names of chemicals, and organic reagents for inorganic analysis.

This new edition is supplied with an unusually complete index, covering more than 3,600 entries, occupying 28 pages, two columns to the page. An advantage to the user is the fact that it makes use of a large size page, good quality non-glare paper, with a size and style of type that makes reading easy and accurate. The section on synthetic rubber, which could easily be expanded in the light of more recent information, is taken from the circular letter prepared by L. A. Wood for distribution by the National Bureau of Standards in 1940.

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The Outlook for Synthetic Rubber. By Melvin A. Brenner. Published by National Planning Association, 800—21st St., N.W., Washington 6, D. C. 5¼ x 7½ in. 36 pp. 25c per copy (lower price in quantity).

Although there has been much comment on the postwar status of both synthetic and natural rubber, this pamphlet is the first public report which has drawn together all existing information on both sides of the question. And, we might add, it represents a good job. Specifically, the report, one of a series of "planned pamphlets" prepared for general distribution on economic angles by the National Planning Association, a privately-financed, non-profit, non-political organization, discusses the development of the synthetic rubber industry since its inception some ten years before Pearl Harbor and its tremendous growth until the present time. It covers the nature of synthetic rubber, the history of the industry, its present program, and its postwar survival prospects.

The author, Melvin A. Brenner, is an economic analyst with the War Production Board, and the report is adapted from a study made by him when he was associated with the National Resources Planning Board. It is Mr. Brenner's premise that the postwar status of synthetic rubber will depend on three things: (1) World rubber supply and demand; (2) The competitive position of synthetic rubber to meet postwar markets; and (3) Government policy. He treats with each of these factors briefly, but thoroughly.

The report includes charts and tables, several taken from various progress reports issued by the Rubber Director, and covers five broad heads, as follows: Synthetic Rubber before Pearl Harbor; Synthetic Rubber Since Pearl Harbor; Postwar Rubber Supply and Demand; Competition Between Natural and Synthetic Rubber; and Government Policy and Outlook for Present Facilities. Every rubber manufacturer should secure a copy of this pamphlet for reading by both his technical and sales forces.

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Standards on Rubber Products: 1944. Prepared by Committee D-11 on Rubber Products. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia 2, Penna. 6 x 9 in. 436 pp. $2.00.

The 1944 edition of this standard work is a greatly enlarged one, containing 136 pages more than the previous edition. It not only gives in their latest form all of the A.S.T.M. specifications and test methods covering rubber and synthetic rubber products, but also includes much supplementary material. About 140 pages are devoted to the general methods of evaluating rubber, covering such items as chemical analysis, sample preparation, accelerated aging, cure, adhesion, abrasion and tear resistance, hardness, compression set, changes in liquids, etc. The latest specifications for rubber and synthetic rubber compounds for automotive and aeronautical applications are given and there are five standards on rubber hose and belting and four on gloves and tape, while the important items on insulated wire and cable include one standard test and eleven specifications. There are sections devoted to latex, sponge products, coated fabrics, packing, non-rigid plastics, electrical tests, and nomenclature and definitions. Furnished with the book are War Emergency Provisions and Specifications.

BOOKLETS, CATALOGS, Etc.

Intercity Buses at War. National Association of Motor Bus Operators, 831 Tower Building, Washington, D. C. 9 x 12 in. 32 pp.

The salient facts about the operation of intercity buses, a flexible form of transportation that serves the community in ways more essential than ever before, are presented in this attractively compiled booklet. The role of buses in transporting troops, manpower to factories, selectees to camps, etc., is reviewed, while such subjects as rubber and fuel conservation, the industry's equipment, maintenance and conservation programs, and the adaptation of bus service to wartime conditions are discussed. The booklet indicates that only 4,000 tons of rubber, or 6/10ths of 1% of the 700,000 tons of rubber consumed by the United States during 1941, was used by intercity bus lines in 1942, and that for each pound of rubber consumed by intercity buses, from 2,000 to 7,000 passenger miles are obtained.

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Dutrex 6—Plasticizer and Extender for GR-S Synthetic Rubber. (Report No. S-8620). Shell Oil Co., Inc., 50 West 50th St., New York 20, N. Y. 9½ x 11½ in. 13 pp.

Called an introductory report on Dutrex 6, a relatively new plasticizer and extender for GR-S, this bulletin gives laboratory data illustrating the use of the new material in various types of GR-S compounds, including tire tread, footwear and channel black compounds. Comparisons are made with two commercial softening agents which are currently accepted in the field. The specific properties of Dutrex 6, described as a high molecular weight hydrocarbon product with a controlled degree of unsaturation and sulfur reactivity, are outlined in the report.

•

Representative Cost Finding Systems in the Plastics Industry. (Report No. 145.) George S. May Business Foundation, 111 So. Dearborn St., Chicago, Ill. 8½ x 11 in. 16 pp.

Originally prepared for and published in *Modern Plastics*, this report, as the title indicates, treats with cost finding systems in the plastics industry. Several specific systems, including those used by the Boonton Molding Co., the Mack Molding Co., and the Tech-Art Plastics Co., are discussed, with the forms used by the respective companies reproduced.

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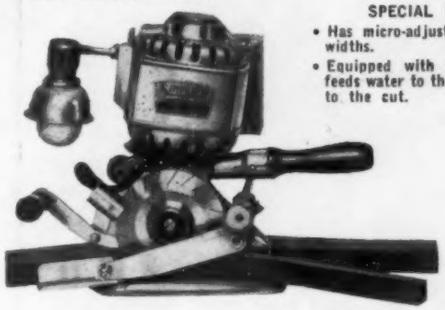

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REVIEWS (CONT'D)

The Statistical Length of Paraffin Molecules. (Publication No. 42.) By L. R. G. Treloar. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England. 7 x 9¾ in. 18 pp.

The relation derived theoretically by Kuhn to represent the probability of a given length (*i.e.*, distance from end to end) for a thermally fluctuating paraffin molecule applies only when the number of chain atoms is large, and when the length is small compared with the length of the fully extended molecule. Methods by which the distribution of lengths over the whole range may be derived for molecules of any chain length are outlined in this report. The results for paraffin chains of 3, 4, 5, 10, 20, 40 and 80 "links" are given. For the higher members of the series the departures from the Kuhn formula increase rapidly as the length approaches that of the extended chain. This result is of importance in the development of the kinetic theory of elasticity of rubber. The report is reproduced from the *Proceedings of the Physical Society* (Vol. LV, p. 345, 1943).

•

Rubber, Polyisoprene and Allied Compounds. Part V. The Chemical Linking of Rubber and of Other Olefins with Phenol-Formaldehyde Resins. (Publication No. 41.) By J. I. Cunneen, E. Harold Farmer and H. P. Koch. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England. 7¼ x 9½ in. 6 pp.

Rubber, isoprenic olefins, and probably most olefinic substances combine in virtue of their unsaturation with the condensation products of phenol and formaldehyde to give chroman derivatives. The detailed structure of the combination products, the relation of chroman-formation to the formation of phenol-formaldehyde resins, and the significance of certain ancillary features of the reaction are discussed in this publication. The work forms part of the program of fundamental research on rubber undertaken by the B.R.P.R.A. and is reprinted from the *Journal of the Chemical Society* (1943).

•

The Course of Autoxidation Reactions in Polyisoprenes and Allied Compounds. Part VII. Rearrangement of Double Bonds during Autoxidation. (Publication No. 43.) By E. H. Farmer, H. P. Koch, and D. A. Sutton. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England. 7¼ x 9¾ in. 8 pp.

Ethyl linolenate and methyl docosahexaenoate, both displaying unsaturation of the methylene-interrupted type, are shown by spectrographic measurements to develop conjugated diene and conjugated triene unsaturation during the incorporation of molecular oxygen. The extent of double bond displacement is correlated with the degree of peroxidation occurring. Squalene and rubber, both displaying a different type of unsaturation, do not similarly develop conjugated units. The mechanism of autoxidative reaction in the two cases is discussed in this report, reproduced from the *Journal of the Chemical Society* (1943).

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Surgical Trade Buyer's Guide: 1944. Compiled and published by Surgical Business, Inc., 369 Lexington Ave., New York 17, N. Y. 6 x 9 in. 130 pp. $1.00 (U. S.); $1.50 (Foreign).

This latest edition of the directory of sources of supply for the surgical supply, hospital supply and orthopedic appliance dealer, the fifth to be published, has been considerably expanded. It contains more pages, more product listings, and more advertising than any previous number. As in the past, it has been compiled to give the surgical trade a reference book that enables dealers to locate at a glance the various sources of supply for any particular item usually sold to the medical or hospital profession. As usual, a large number of rubber drug sundries are included.

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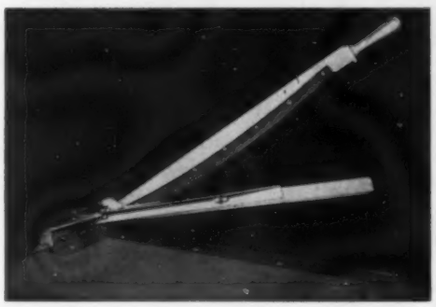

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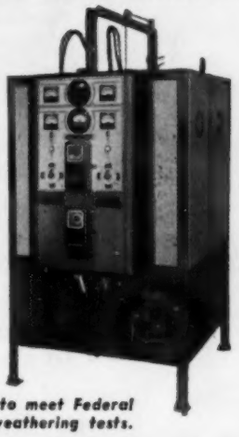

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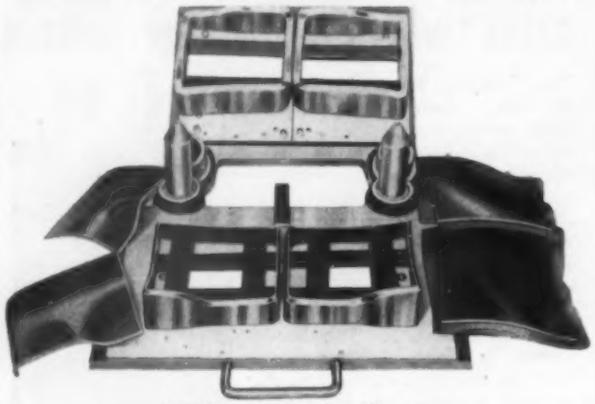

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REVIEWS (CONT'D)

The Physical Chemistry of Rubber Solutions. (Publication No. 40.) By G. Gee. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England. 5¼ x 8¼ in. 32 pp.

This is an excellent review of the physical chemistry of rubber solutions although it reveals a field of work burdened with a mass of data which until recently were almost uncorrelated and imperfectly understood. Considerable theoretical advances have been made in the last few years, and each of these is discussed and critically reviewed. These include the micellar theory of rubber structure, osmotic pressure measurements, the viscosity of rubber solutions, and limited swelling. These theories, as the author concludes, provide a sound foundation on which to build, but are clearly indicative of the fact that there is a long way to go before anything approaching a complete understanding is achieved.

●

Lode: A Soft "Mineral Rubber" for Use with GR-S. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11 in. 8 pp.

This laboratory report shows the effect on physical properties of using various proportions of Lode, a new type of soft "mineral rubber," in representative GR-S compounds. Lode is actually a compounded asphalt product which is somewhat comparable to mineral rubber. Results of tests on a GR-S tread compound, a general mechanical goods compound, a low GR-S content compound, and a compound containing a mineral filler are given. The results indicate that Lode appears suitable for use in GR-S tread compounds and that high proportions of it together with high loadings of filler give good mechanical stocks.

●

Latex Compounding of GR-S. By H. F. O'Connor and C. W. Sweitzer. Columbian Carbon Co. (Binney & Smith Co., Distributors), 41 East 42nd St., New York, N. Y. 5⅜ x 7¼ in. 16 pp.

Issued as Vol. V, No. 1 in the series of "Columbian Colloidal Carbons," this booklet is a reprint of the article which appeared in the February, 1944, issue of RUBBER AGE. It treats with a new technique for compounding GR-S latex, either with carbon alone or with carbon plus other compounding ingredients, and gives results of a series of tests comparing the properties of latex and mill compounded GR-S latex. The properties of latex and mill compounded GR-S at optimum cure are also shown in graph form.

●

Taylor Pneumatic Set Controller. (Bulletin No. 98159.) Taylor Instrument Companies, Rochester 1, N. Y. 8½ x 11 in. 8 pp.

Both the uses and the operating principles of the Fulscope Pneumatic Set Controller are covered in this bulletin, which is liberally illustrated with photographs and simplified application drawings. In applications where a temperature, a pressure, a rate of flow, or a liquid level must automatically conform to changes in another variable related to the same process, Pneumatic Set is said to offer a versatile, highly responsive control which reduces the adverse effects of time lag and load change. Various types are described and illustrated.

●

Data on the maintenance, lubrication and repair of chain belt drives is furnished in a booklet entitled *Wartime Care of Chain Belt Drives* (Bulletin No. 435), issued by the Chain Belt Co., Milwaukee 4, Wisc.

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Many of the special models which have been designed for unusual handling operations, as well as all of the company's standard *electric trucks*, are illustrated and described in a new 20-page catalog (No. 52) issued by the Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland 13, Ohio.

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NEW YORK, APR. 13, 1944

Crude Rubber

AS RECENTLY indicated in these columns, pacts are being negotiated, and in some cases have probably already been signed, with various Latin American countries under which premium prices will be paid for rubber. As in the case of the original Brazilian pact, the agreements call for the various countries affected to take over some of the specific obligations accrued by the Rubber Development Corporation.

The major news of importance in the over-all crude rubber field in the past few weeks was the official opening of a new guayule processing plant in Mexico. This plant, located in northern Mexico, will be operated by Sochule S.A., a joint venture of the General Tire & Ruber Co. and Mexican financial interests. It will have a milling capacity of 1,500 to 2,000 tons of guayule rubber annually.

Opening the Sochule plant in Mexico means that the production of guayule rubber in that country will be increased gradually for the next few years. In 1943, Mexico is reported to have furnished the United States with about 8,000 tons of guayule rubber. Operations at the Sochule plant, which cost approximately $400,000 to construct, plus expanded operations at other milling plants in Mexico, should provide this country with at least 12,000 tons of guayule rubber during the current year.

In this country, efforts are being made in Congress to block further appropriations for the continuation of the guayule rubber program and to force its liquidation in twelve months or thereabouts. This decision was reached in the belief that the program is too costly and is not of direct aid to the immediate war effort. Hearings on an appropriations bill in the Senate are scheduled to start soon.

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Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21¾	38⅞
Thin Brown Crepe, 1X	21¾	38⅞
Thick Remilled Blankets, #1	21¾	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅝	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12¾	26¼
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11¾	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44½
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

The scrap rubber trade is slowly recovering from the effects of the government's decision to retire from the market, but is not as yet back to complete trade normalcy. Rubber Reserve continues to release its scrap holdings slowly but steadily, which makes for a rather light demand on trade sources. The supply, however, is still ample for some time to come. Record-keeping requirements for persons making purchases or sales of scrap (or reclaimed) rubber have been considerably modified by Amendment No. 10 to R.P.S. 87. Sellers and buyers need no longer keep records showing the quantity of each grade and quality on hand and on order as of the close of each month. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¼
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of **20.37c at the ten designated southern markets.**

Cotton

The price of middling uplands on the Cotton Exchange has moved in the very narrow range of 29 points since our last report, high for the period being 21.95 on April 11 and low 21.66 on March 17. The average price for middling uplands in the month of March was 21.65, based on 27 trading days. Prices moved up steadily from the middle until the end of March, largely based on steady mill interest, but wavered a bit at the tail end of the month. Nervous selling unsettled the price structure in the first few days of the current month, but a renewed wave of trade purchasing started the price upward again. Increased mill price fixing and Southern buying have combined in the past few days to give the market a steadying effect. Crop news is generally considered unfavorable, especially in those sections where rainfall has been unusually heavy. One favorable feature is that a good season is now in the ground, although plowing is reported to be two to four weeks behind. Uncertainty exists as to ultimate planting intentions, with a small decrease indicated over last season. Quotations for middling uplands on the Exchange (old contract) follow:

	Mar. 14	April 13		
	Close	High	Low	Close
May	20.70	21.10	21.05	21.08
July	20.13	20.77	20.19	20.70

Reclaimed Rubber

The demand for reclaim continues at the same high pace as in recent months. Reclaimers feel that the latest regulation on the permitted use of GR-S in camelback grades will have little effect on the demand from this branch of the industry because of the satisfactory performance results achieved with all-reclaim grades. Demand from other branches of the industry, especially from manufacturers of heels and soles, has increased somewhat in recent weeks, so that no slack of any kind is anticipated in the near future. Experiments with reclaiming synthetic scrap continue, with reclaimers still asserting that this phase of development will hold no special difficulties. Prices shown below are ceilings on typical grades of reclaimed rubber:

Shoe			
Unwashed	lb.	.07 @	.07¼
Tube			
Black Tube	lb.	.11¼ @	.11½
Red Tube	lb.	.12 @	.12¼
Tires			
Black (acid process)	lb.	.07½ @	.07¾
Black, selected tires	lb.	.06½ @	.06¾
Truck, Heavy Gravity	lb.	.08½ @	.08¾
Miscellaneous			
Mechanical blends	lb.	.04½ @	.05½
White	lb.	.13 @	.13¼

Ducks

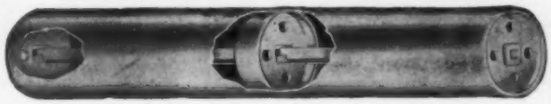
Enameling (single filling)	lb.	— @	.44¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¾
Double filling, A grade	lb.	— @	.20¾

New and Better

GAMMETER'S

ALL STEEL **ALL WELDED**

CALENDER STOCK SHELL



4" - 5" - 6" - 8" - 10" - 12" diameters, any length.

Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

Carey
EST. 1873

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OXIDES AND CARBONATES—LIGHT AND HEAVY FOR TECHNICAL AND DRUG USES

THE PHILIP CAREY MFG. COMPANY
Cincinnati, Ohio

Branches in all principal cities
WM. S. GRAY & CO., *Distributors,* **New York City**

Let us estimate on your

CUTTING DIES

● Years of experience making dies of all kinds for rubber manufacturers enable us to offer you correctly designed dies of tempered steel which retain their cutting edges....*Send blue print for quotation.*

BROCKTON CUTTING DIE & MACHINE CO. INC.
CUTTING AND PERFORATING DIES

AVON. **MASS.**

AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 Windsor St. Hartford, Conn.
Representatives: **Akron** **San Francisco** **New York**

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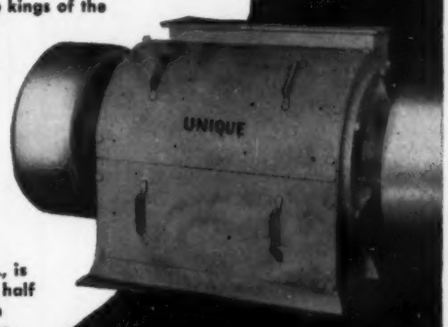
AND ALLIED INDUSTRIES
MILLS, CALENDERS, HYDRAULIC PRESSES,
TUBERS, VULCANIZERS, MIXERS, ETC.
ERIC BONWITT AKRON, OHIO

FOR PLASTICS SCRAP, RUBBER FILLERS, ETC.

KNIFE CUTTERS

Heavy duty salvage kings of the plastics and rubber industry!...For the reduction of irregular shapes and sizes to uniform ⅛" and ¼" particles...speedily ...economically. Dependable performance of complete line which includes mixers, crushers, sifters, etc., is backed by almost a half century of service in the materials processing field.



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Extra balance wheel of this cutter carries intermittent shock load. Knives adjustable. Screen removes and replaces easily. Designed for cutting tough fibrous products, plastics, rubber.

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CONTINENTAL-MEXICAN RUBBER CO., Inc.
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Producer in Mexico of

GUAYULE RUBBER

Washed — AMPAR BRAND — Dried

Formerly Distributed By
CONTINENTAL RUBBER COMPANY OF NEW YORK
An Affiliated Company

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PULLEYS
DRUMS-ROLLS
SEPARATORS
MAGNETS - All Kinds

Stearns Improved Air Cooled Magnetic Pulley

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Processing scrap rubber requires Stearns Magnetic pulleys or other types of magnetic separators. For economical, automatic, efficient protection against costly shutdowns due to tramp iron damage, Stearns Magnetic equipment will pay for itself many times over—a definitely profitable investment.

WRITE FOR BULLETIN 302

STEARNS MAGNETIC MFG. CO.
540 S. 28th St. Milwaukee, Wis.

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The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H. White; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber "PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York 20, N. Y.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron 8, Ohio

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 41 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
WITCO . . . CONTINENTAL
A grade to meet every rubber processing requirement . . . manufactured under rigid laboratory control.
Witco Chemical Company
295 Madison Avenue
New York 17, N. Y.

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Ingredients—Whiting, Clay, Tale, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumise Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York 13, N. Y.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
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CHEMICALS
PIGMENTS
ASPHALTUMS
Witco Chemical Company
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New York 17, N. Y.

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
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Cable Address: Jacobite Boston

CLAY
*CHAMPION
*MAGNOLIA
National Kaolin Company
Distributed by
C. P. HALL CO.
Akron — Los Angeles — Chicago

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N.Y.

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From Coal Tar Bases—For Use As Antiseptics, Plasticizers, Reclaiming Oils, Softeners, Solvents, Tacifiers.
Koppers Company
Tar and Chemical Div.
Koppers Bldg. Pittsburgh, Pa.

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St., New York 1, N. Y.

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For Rubber	For Industry Generally	
Accelerators	*Acids*	*Latex*
Anti xidants	*Oil of Myrbane*	*Lotol*
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NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK 20, N. Y.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

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For All Cures
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Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

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Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon
Pampa, Texas

OROPLAST
Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks
Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

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Vulcanizing Agents — Pigments
Accelerators — Clays
Antioxidants — Mineral Rubber
Plasticizers — Aromatics
Dispersions — Blacks
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IRON OXIDES
Asbestine—Barytes—Talc—Soapstone
C. K. Williams & Co.
EASTON, PA.

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
The C. P. Hall Co.
2510 First Central Tower
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CUMAR —Paracoumarone Resin.
A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*
THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

MAGNESIA
Calcined Magnesia—for neoprene
Carbonate of Magnesia—precipitated
The Philip Carey Mfg. Co.
Cincinnati Ohio

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
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General Sales Agents for
GENERAL ATLAS CARBON
Pampa, Texas

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DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

PLASTICIZERS and SOFTENERS
For Synthetic Rubber, Polyvinyl Butyral, etc.
Glyco Products Co., Inc.
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NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.
Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAGNESIUM OXIDE
Extra Light—Original neoprene type
Also Light, Medium and Heavy types
General Magnesite & Magnesia Co.,
2960 East Venango St., Phila. 34, Pa.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)
Stamford Rubber Supply Co.
Stamford, Conn.

MICA
"CONCORD" Wet Ground Mica
Its *White, Pure* and *Uniform*
Send for Samples and Prices
CONCORD MICA CORP.
Penacook Station Concord, N. H.

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

FURNEX—FURNEX BEADS
The High Resilience Semi-Reinforcing Black
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MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
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Cincinnati Ohio

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
National Rosin Oil & Size Co.
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Chemicals and Compounding Materials {continued}

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"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.
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Skelly Bldg., Kansas City, Mo.

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TITANOX
Unsurpassed in
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Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
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ZINC OXIDE PIGMENTS
The XX Reds Kadox
ZINC SULPHIDE PIGMENTS
The Cryptones The Albalithe (Lithopones)
The New Jersey Zinc Sales Co.
New York *Chicago*
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STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
BINNEY & SMITH CO.
41 East 42nd St. New York City

ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC OXIDES
Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
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250 Park Ave. New York
Plant and Laboratory: Monaca (Josephtown), Pa.

SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
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The Progressive Concern Selling to Rubber Manufacturers Uses
THE MARKET PLACE
for Results

ZINC STEARATE
ZINC LAURATE
Colite Mold Lubricant for Extra High Gloss
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Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.
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Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems
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Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.
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CALENDER SHELLS
Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.
The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness
For measuring the thickness of rubber and similar materials. Many models.
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GRINDING MILLS
SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.
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Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations
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For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.
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"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order
Akron Standard Mold Co.
Akron, Ohio

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Also Tools, Dies, Jigs, Fixtures. Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.
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The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of
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A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
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MANDRELS—All Types
Circular and Straight—Aluminum and Steel
Licensed Under Clyde E. Lowe Co. Patents
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National Sherardizing & Machine Co.
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For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
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A Comprehensive Line of Rubber and Plastic Equipment Including Tubers and Extruders, Tire Builders and Vulcanizers, Spreaders, Mixers, etc.
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Akron, Ohio

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For tires, rubber specialties and mechanical goods; general machine work.
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Akron, Ohio

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A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.
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Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.
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Processing Equipment
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Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
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RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
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P. O. Box 963 Providence, R. I.

MAGNETIC EQUIPMENT of All Kinds
Separators, Drums
Clutches, Brakes
Rolls, Special Magnets
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Strips slab rubber up to 1" thick, 20,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.
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For Rubber & Allied Industries
Mills, Calenders, Hydraulic Presses, Tubers, Vulcanizers, Mixers, etc.
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Rubber—Crude; Scrap; Latex; Dispersions

CRUDE RUBBER
BALATA—SYNTHETIC CHICLE
We handle Manufacturers' Crude Rubber and Balata Purchase Permits.
Charles F. Connor & Co., Inc.
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Telephone: LAFayette 1202

DISPERSITE
Water Dispersed Rubber
(Reclaimed—Crude—Synthetics)
Man-made Alternate for Latex
Dispersions Process, Inc.
1230 Sixth Ave., New York, N. Y.
Branch Office in Detroit

LOTOL
(Compounded Latex)
Ready to use
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
Rockefeller Center, New York, N. Y.
Branch Office in Detroit

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST
H. Muehlstein & Co., Inc.,
122 E. 42nd St., New York City
BRANCHES: Akron, Chicago, Boston, Los Angeles, Memphis, London.

GUAYULE RUBBER
AMPAR BRAND
Washed and Dried
Continental-Mexican Rubber Co.
Incorporated
745 Fifth Avenue, New York City
Formerly Distributed By
Continental Rubber Co., of N. Y.

REVERTEX
Highly Concentrated (About 75%)
Rubber Latex
Sole Distributor for U. S. A. and Canada
Revertex Corp. of America
37-08 Northern Blv'd., L. I. City 1, N. Y.

CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA
Hermann Weber & Company
76 Beaver St. New York

LATEX
Normal, Concentrated, Processed
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

RUBBER
Crude Rubber
Liquid Latex
Ernest Jacoby & Co.
79 Milk St. Boston, Mass
Cable Address: Jacobite Boston

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Rubber [Cont'd]

RUBBER and PLASTICS SCRAP

ROTEX RUBBER CO., INC.
437 Riverside Ave., Newark, N. J.

RUBBER—Scrap and Crude
Also HARD RUBBER DUST
A. SCHULMAN, INC.
790 E. Tallmadge Ave., Akron 9, Ohio
14th & Converse Sts., E. St. Louis, Ill.
738 Statler Bldg., Boston 16, Mass.
500 Fifth Ave., New York 18, N. Y.
509 Mill St., Conneaut, Ohio
Warehouses: Akron, E. St. Louis, Boston.

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
666 Main St. Cambridge, Mass.

Reclaimed Rubber . . . .

NERVASTRAL RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
Rubber & Plastics Compounds Co., Inc.
30 Rockefeller Plaza, New York, N. Y.
Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. City

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

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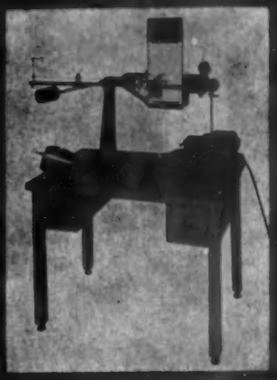

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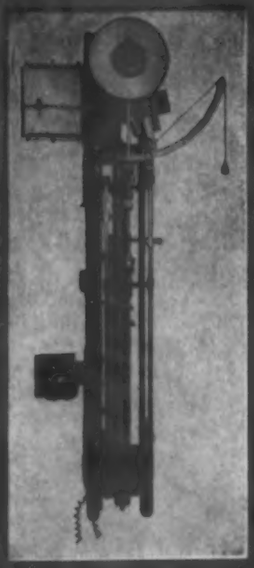

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